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MANAGEMENT SITUATION ANALYSIS

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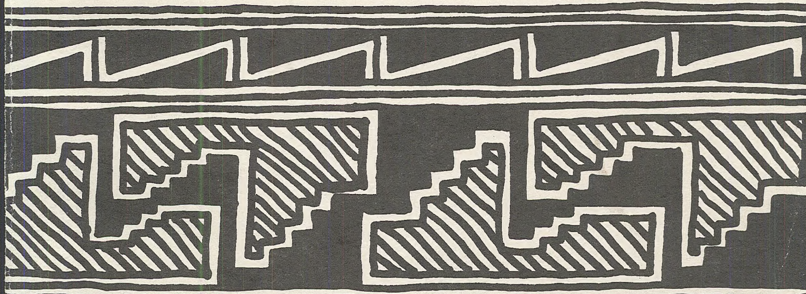

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MANAGEMENT SITUATION ANALYSIS

for the

SAN JUAN RESOURCE MANAGEMENT PLAN

Prepared by:

San Juan Resource Area
and
Moab District

Bureau of Land Management
U.S. Department of the Interior

September 1985

NOTE: This document is subject to revision.

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SAN JUAN RESOURCE AREA

MANAGEMENT SITUATION ANALYSIS

Foreword

This document is an internal (or "shelf") document intended primarily for use by BLM resource specialists and others who are familiar with the BLM planning process and natural resource management programs. It therefore makes liberal use of acronyms, abbreviations, and technical language that may be unfamiliar to the general public. Acronyms are not spelled out the first time they are used, as is the policy in any document intended primarily for public use; however, Part III contains both a glossary of terms and a list of acronyms and abbreviations.

The data in this document are the best available at the time of preparation; however, all information is subject to change and may differ from data presented in the RMP/EIS. As new information becomes available, it will be inserted into the working copies of the MSA found at SJRA, MDO, and the Public Room, USO. A reader with specific questions about data changes is encouraged to contact the SJRA office.

The MSA is being printed at this time because the distribution requests already received would make it uneconomical for in-house reproduction. It will not be reprinted, even though the data it contains may change over time.

The page numbering system in Part II is according to subject matter. Each resource management program (for example, 4111 Oil and Gas Leasing) is a separate chapter in Part II, and the pages within that chapter are numbered accordingly (for example, 4111-1, 4111-2, etc.). Table O-1 in the Overview will add to the reader's understanding of this system.

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[a] East half only.

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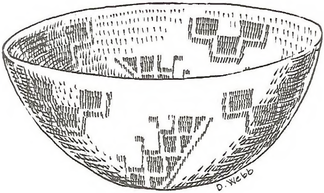
OVERVIEW



SAN JUAN RESOURCE AREA MANAGEMENT SITUATION ANALYSIS

Overview

INTRODUCTION

This document analyzes current management of the BLM's SJRA, Moab District, Utah (see figure 0-1). It presents information current as of March 1985, and may be updated as noted on the cover sheet.

This information has been compiled as part of the process leading to development of the San Juan RMP. The purpose of the RMP is to guide management of the public lands and resources in the SJRA. The RMP will define land use and resource allocations to achieve the highest and best use of public lands and resources within the framework established by law, regulation, and agency policy.

The purpose of the MSA is to describe the current management of public lands and resources within the resource area, analyze the effectiveness of BLM's current management, and define opportunities for and limitations on resource use and protection. The MSA is intended to provide background material for the RMP/EIS's description of the affected environment; the basis for the alternative plans to be assessed; and threshold levels for the estimation of significant effects of those alternatives.

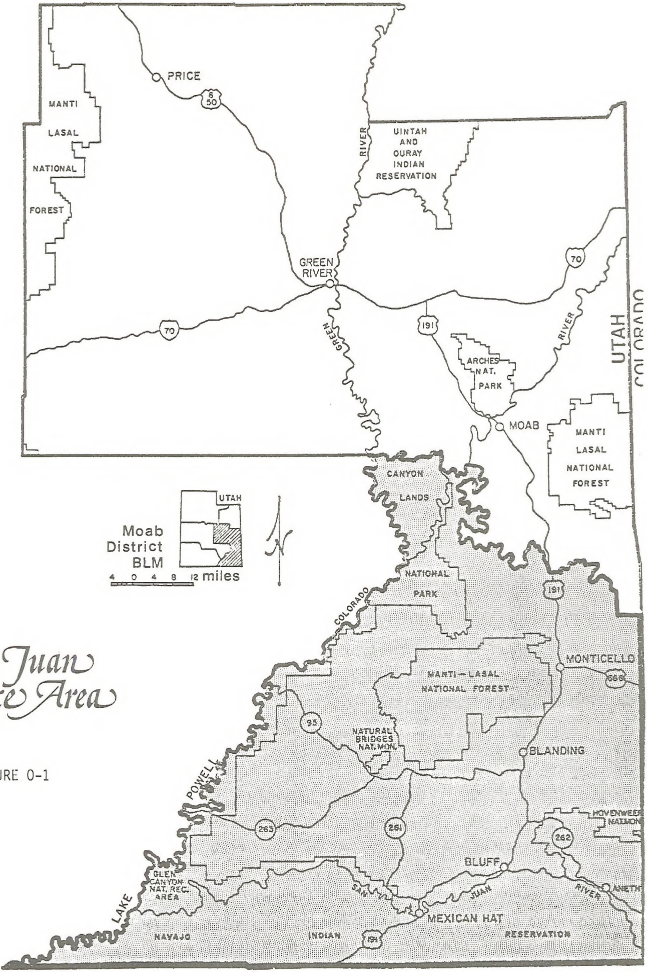
The MSA is divided into three parts:

Part I - Physical profile of the natural resources and cultural facilities found within the resource area.

Part II - Resource management programs administered by the resource area (see table 0-1). The following topics are covered for each program:

- description of the current management situation;
- analysis of the capability of the resource to respond to current and future demands for its use; and
- identification of management opportunities and problems, and potential resolution of those problems.

Part III - General information, including a list of preparers, a list of applicable laws, a list of acronyms and abbreviations used, a glossary, and a list of the references cited.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6
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MANTI
LASAL
NATIONAL
FOREST
RIVER
UINTAH
AND
OURAY
INDIAN
RESERVATION
GREEN
RIVER
70
70
GREEN
191
RIVER
UTAH
COLORADO
ARCHES
NAT.
PARK
MOAB
MANTI
LASAL
NATIONAL
FOREST
CANYON
LANDS
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COLORADO
191
MONTICELLO
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MANTI — LASAL
NATIONAL FOREST
95
NATURAL
BRIDGES
NAT. MON.
BLANDING
POWELL
263
261
HOVENWEEP
NAT. MON.
262
BLUFF
GLEN
CANYON
NAT. REC.
AREA
SAN
JUAN
RIVER
ANETH
LAKE
MEXICAN HAT
NAVAJO
INDIAN
191
RESERVATION

San Juan Resource Area

FIGURE 0-1

TABLE 0-1

BLM Resource Subactivity Programs Used for the MSA and RMP

MSA Resource Management Programs		RMP Resource Management Programs	
Code	Title	Code	Title
4111	Oil and Gas Leasing	4111 4112	Oil and Gas Management (Public Lands) Oil and Gas Management (Indian Lands)
4112	Coal Leasing	4121	Coal Management
4114	Oil Shale/Tar Sand Leasing	4122	Oil Shale/Tar Sand Management
4131	Mineral Material	4131	Mineral Materials Management
4132	Mining Law Administration	4132	Mining Law Administration
4133	Mineral Leasing	4133 4134	Mineral Management (Non-Energy Leasables) Uranium Management (Leasable)
4211 4212	Energy Realty Non-Energy Realty	4211 4212	Rights of Way Lower 48 Lands Program
4213	Withdrawal Processing and Review	4220	Withdrawal Processing and Review
4310	Forest Management	4311 4312	Forest Management Forest Development
4322	Grazing Management	4322	Grazing Management
4331	Natural History/Cultural Management	4331	Cultural Resources Management
4332	Wilderness Management	4332	Wilderness Management
4333	Recreation Management and VRM	4333	Recreation Resources Management and VRM
4340	Soil, Water, and Air	4341	Soil, Water, and Air Management
	(no corresponding code)	4342	Hazardous Waste Management
4350	Wildlife Habitat Management	4351	Habitat Management
	(under 4322 and 4350)	4352	Endangered Species Management
4360	Fire Management	4360	Fire Management

The resource programs managed by the BLM are identified by four-digit program subactivity codes (see table 0-1). The program subactivities and their codes changed at the beginning of FY 85. The MSA uses the pre-FY 85 subactivities, because the information used to analyze the current management is based on the prior codes. The RMP and the analysis of alternatives in the EIS will use the FY 85 programs, because future resource management will be done on that basis. A correlation of resource subactivity programs used in the MSA with those used in the RMP is shown in table 0-1.

The BLM has other resource management programs not shown in table 0-1, such as wild horse and burro management. These have been ommitted from the MSA and RMP listings because the resource covered does not occur in the SJRA.

The MSA serves, among other things, to identify and sort problems encountered with current resource management. Within each resource management section in Part II, opportunities to correct or enhance current management are divided between those which can be achieved through the RMP and those which can be resolved through other means. A summary of those findings is shown in table 0-2. This will serve as part of the basis for formulating alternative plans to be assessed in the RMP/EIS, and for determining resource allocations to be generated by the RMP.

Resources and management allocations have been depicted on a series of mylar overlays. These are a part of this document and are incorporated by reference. They are located at the SJRA office.

The overlays are made to fit one of two base maps of the resource area. The area covered by each base map is shown in figure 0-2. The base maps are on a scale of 1/2 inch to 1 mile, and show prominent cultural and topographic features. Land surface ownership is also shown on the base maps, but is not necessarily current. Figure 0- 2 also shows the boundaries of the planning units on which the MFPs were based.

Overlays included are referenced in each MSA section listed in table 0-1.

GEOGRAPHIC SETTING

The SJRA, within the Moab District, is responsible for management of BLM administered lands and resources in the majority of San Juan County in southeastern Utah (see figure 0-1). The resource area is bordered by the Colorado state line on the east, the Arizona state line on the south, the Colorado River on the west, and CNP and the BLM's Grand Resource Area on the north. Monticello and Blanding are the two main communities within the resource area.

The SJRA is also responsible for management of some resources on lands administered by other federal agencies. The BLM manages grazing and minerals on NPS administered land, federal minerals on USFS administered land, and certain federal minerals on Indian reservation land administererd by the BIA and Indian tribal councils. The SJRA administers grazing allotments that extend into the Grand Resource Area on the north and the San Juan Resource Area, Montrose District, Colorado on the east.

TABLE O-2

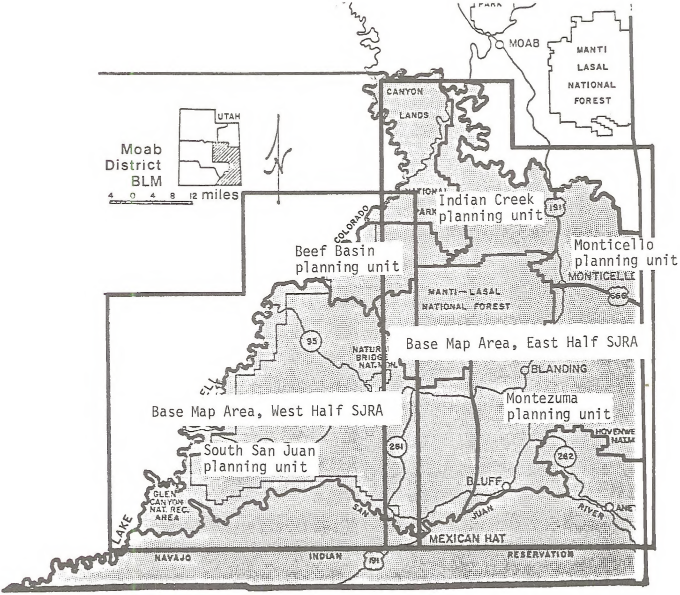
Summary of Management Opportunities Identified in MSA

Resource Management Program	To Be Resolved Through RMP	To Be Resolved Administratively	Potential ACECs Identified
4111 Oil and Gas Leasing	Evaluate and adjust existing oil and gas leasing categories.	Review KGSs.	None.
4112 Coal Leasing	Prepare coal leasing unsuitability study (defer until interest develops).	None identified.	None.
4114 Oil Shale/Tar Sand Leasing	Develop CHL categories.	Identify and designate additional STSAs.	None.
4131 Mineral Material	Identify areas to be closed or to remain open for the extraction of mineral materials, and areas to remain open for free use of petrified wood.	Rehabilitate existing unreclaimed abandoned sites. Establish community pits at Bluff and Zeke's Hole.	None.
4132 Mining Law Administration	Identify potential mineral withdrawals or areas not to be withdrawn from mineral entry.	Rehabilitate existing unreclaimed abandoned uranium workings.	None.
4133 Mineral Leasing	None identified.	Identify and designate additional KPLAs.	None.
4211 Energy Realty 4212 Nonenergy Realty 4213 Withdrawal Processing and Review	Identify criteria to evaluate lands disposal actions. Identify potential withdrawals and terms, or areas not to be withdrawn.	Propose alternative lands actions where disposal or other long-range actions are precluded. Propose alternative lands actions to resolve unauthorized use or trespass.	None.
4310 Forest Management	Define various permit areas for forest product use.	Consider alternative means to achieve land treatments to enhance aesthetic values. Consider sequential use of proposed chaining areas. Consider potential for unconventional forest products.	None.
4322 Grazing Management	Adjust livestock management levels after completion of monitoring (within 5 years after RMP/EIS ROD) or in response to resource conflicts identified in the RMP. Identify allotments for development of AMPs. Summarize problem areas within specific allotments in RPS, following completion of RMP. Identify, evaluate, and designate areas for special management as ACECs or RNAs to protect relict plant communities.	Consider adjustment of allotment boundaries.	Bridger Jack Mesa (3,800 or 5,200 acres) near-relict plant community. Lavender Mesa (640 acres) relict plant community.
4331 Natural History/Cultural Resources Management	Identify, evaluate, and designate areas for special management as ACECs, National Natural Areas, ONAs, RNAs, National Natural Landmarks, or National Register Sites to protect areas with natural history or cultural resource values. Identify and designate cultural use allocation zones. Develop and implement CRMPs using management prescriptions developed in the RMP.	Reorganize staffing, funding, procurement and program emphases to achieve enhancement, protection, and preservation of cultural resources. Conduct an areawide natural history/paleontological/cultural resource inventory and mapping program. Communicate with Indian tribes to safeguard tribal religious sites.	Alkali Ridge (225,000 acres) cultural values. North Abajo (75,000 acres) cultural values. Grand Gulch (4,000 acres) cultural values.
4332 Wilderness Management	Determine how WSAs and ISAs will be managed if not designated wilderness and dropped from the wilderness review process by Congress.	None identified.	(See other resource management programs.)

(continued)

TABLE O-2 (Concluded)

Resource Management Program	To Be Resolved Through RMP	To Be Resolved Administratively	Potential ACECs Identified
4333 Recreation Management/ Visual Resources Mgmt.	Designate all of the SJRA as open, limited, or closed to ORV use. Identify areas to be maintained in each ROS class. Identify and designate additional developed recreation sites. Develop and implement management plans for all SRMAs after completion of RMP. Approve VRM classes. Identify, evaluate, and designate areas for special management as ACECs or ONAs to protect recreational and visual resource values.	Support NPS study of the San Juan River under Wild and Scenic Rivers Act. Reorganize staffing and funding for management of SRMAs. Monitor use and develop facilities within SRMAs. Involve VRM specialist for project planning and design.	Dark Canyon PA (62,040 acres) primitive recreational values. Grand Gulch (55,000 acres) primitive recreation values. Bridger Jack Mesa (5,290 acres) primitive recreation values. Lavender Mesa (640 acres) primitive recreation values. Lockhart Basin (56,660 acres) scenic values.
4340 Soil, Water, and Air	Identify areas that would benefit from projects aimed at improving watershed conditions, in cooperation with other resource management programs, through activity plans, AMPs, etc. developed after completion of RMP. Identify sensitive watershed areas and develop special stipulations and watershed management activity plans after completion of RMP. Identify, evaluate, and designate areas for special management as ACECs to recognize natural hazards and to protect watershed and air quality related values.	Collect inventory data to support watershed and air quality studies.	Recapture Dam Drainage Basin (7,000 acres) municipal watershed. Montezuma Creek Drainage (165,000 acres) hazardous watershed conditions. Indian Creek Drainage (25,000 acres) hazardous watershed conditions. 3 Sensitive Soils Areas (Comb Wash, 5,000 acres; Butler/Cottonwood/Recapture Creeks, 42,000 acres; Montezuma Creek/Alkali Canyon, 70,000 acres) hazardous soils conditions. Dark Canyon PA (62,040 acres) air quality values. Grand Gulch PA (37,807 acres) air quality values.
4350 Wildlife Habitat Management	Identify areas that would benefit from an HMP, and develop HMP following completion of RMP. Identify areas needing special protection and develop stipulations to be applied to other resource use activities. Identify, evaluate, and designate areas for special management as ACECs to protect significant wildlife habitat values.	Inspect and maintain existing wildlife facilities.	Hatch Point-Dry Valley Antelope Habitat (34,000 acres) wildlife habitat. Crucial Desert Bighorn Habitat (2 areas) (33,000 acres) wildlife habitat. Aquatic and Riparian Habitats (16 areas) (38,400 acres) wildlife habitat. Crucial Deer Winter Range (7 areas) (152,500 acres) wildlife habitat.
4360 Fire Management	Identify fire suppression areas. Develop action plans to set parameters for different suppression areas, after completion of RMP.	Conduct actions in specific areas to reduce fire hazard.	None.


PARK
MOAB
MANTI LASAL NATIONAL FOREST
UTAH
Moab District BLM
4 0 4 8 12 miles
CANYON LANDS
NATIONAL PARK
COLORADO
Indian Creek planning unit
191
Monticello planning unit
MONTICELLO
666
Beef Basin planning unit
MANTI—LASAL NATIONAL FOREST
Base Map Area, East Half SJRA
95
NATURAL BRIDGES NAT. MON.
BLANDING
Montezuma planning unit
HOVENWEEP NAT. MON.
262
Base Map Area, West Half SJRA
261
South San Juan planning unit
BLUFF
GLEN CANYON NAT. REC. AREA
LAKE
SAN
JUAN
RIVER
ANETH
MEXICAN HAT
NAVAJO
INDIAN
191
RESERVATION

Base map coverage: ½" = 1 mile

FIGURE 0-2

San Juan Resource Area Base Map Coverage
and Previous Planning Units

Within the SJRA boundaries, however, the BLM's Grand Resource Area administers a small area of grazing; the Farmington Resource Area office, Albuquerque District, New Mexico, shares administration of certain aspects of oil and gas resource management on a small area of public and Indian reservation lands; and the San Juan Resource Area, Montrose District, Colorado, administers grazing on certain allotments and federal minerals under a small area of Indian allotments. Management of the San Juan River is administered jointly by the SJRA and the NPS.

Public land and resource management forms a complex pattern within SJRA; the agency administering the surface estate is not always the agency administering the mineral, grazing, or recreation resources. Land surface administration within SJRA boundaries is shown in table 0-3. Table 0-4 shows the minerals management responsibility compared to the surface administration, and gives the extent of split-estate lands within the SJRA. Management responsibility for grazing and recreation resources is shown in table 0-5, where the acres administered by SJRA do not coincide with public lands within the resource area boundaries.

THE PLANNING PROCESS

BLM planning is described as issue-driven, meaning that planning is undertaken to answer questions about specific land management opportunities or problems, called issues. The issues are identified at the outset of the RMP process, and are posed as questions regarding use or management of the public lands.

The different ways of answering these questions serve as the alternatives considered in the EIS, and the RMP finally decided upon is shaped by the manager's answers to those questions. However, the RMP is written to provide program-specific guidance to cover management of all resources throughout the entire resource area.

Under the planning regulations at 43 CFR 1610.4, the preparation and implementation of an RMP is completed in nine steps (see figure 0-3). These are: (1) identification of issues; (2) development of planning criteria; (3) collection of inventory data and information; (4) analysis of the management situation; (5) formulation of alternatives; (6) estimation of effects of alternatives; (7) selection of the preferred alternative; (8) selection of the RMP; and (9) monitoring and evaluation.

Five documents are completed during preparation of the RMP to record the planning process. These documents are: the Preplanning Analysis; the MSA; the draft RMP/EIS; the proposed RMP and final EIS; and the record of decision and final RMP. Each document serves as a foundation for the one following. The relationship of the MSA, EIS and final RMP is shown in figure 0-3.

TABLE 0-3

Land Surface Administration (acres)

Jurisdictional Unit	Unit Total	Agency Total	Total
FEDERAL OWNERSHIP			3,935,868.52
BLM Administered Public Lands		[a]1,779,193.21	
NPS		569,176.34	
CNP	247,998.47		
GCNRA	312,656.38		
Hovenweep NM	440.00		
Natural Bridges NM and	7,445.49		
access Road	175.00		
Rainbow Bridge NM	461.00		
USFS		367,006.41	
Manti-LaSal NF	366,853.91		
Baker Ranger Station	152.50		
Navajo Indian Reservation		1,220,492.56	
STATE OWNERSHIP			244,955.22
State Lands Commission	244,935.22		
State Parks and Recreation	20.00		
PRIVATE INDIAN TRUST LANDS			22,998.31
Ute Indian Allotments	12,297.43		
Navajo Indian Allotments	10,700.88		
PRIVATE OWNERSHIP			335,155.99
HUD	40.00		
BLM	61.89		
DOE	79.54		
Ute Mountain Tribe	840.00		
Navajo Tribe	1,280.00		
Other Private Lands	332,854.56		
TOTAL			4,538,978.04

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[a] Includes 3,053 acres of accretion land which is subject to the decision regarding ongoing litigation.

Source: BLM Master Title Plats, December 1984.

TABLE 0-4

Management of Mineral Resources (acres)

ADMINISTRATION OF SURFACE ESTATE		ADMINISTRATION OF MINERALS ESTATE			
Managing Agency or Surface Owner	Total Surface	Federal Minerals by BLM	Federal Minerals by Other Federal Agency	State Minerals by State	Private Minerals by Owner
BLM (Public Lands)	1,779,193.21				
Federal Minerals		1,775,188.21			
State Minerals				1,365.00	
Private Minerals					2,640.00
NPS	569,176.34				
CNP	(247,998.47)				
Federal Minerals			[a]242,292.49		
State Minerals				5,705.98	
GCNRA	(312,656.38)				
Federal Minerals		260,249.60			
State Minerals				800.00	
Indian Minerals			[b]51,606.78		
Hovenweep NM	(440.00)				
Federal Minerals			[a]440.00		
Natural Bridges NM	(7,445.49)				
Federal Minerals			[a]7,445.49		
Natural Bridges NM Access Road	(175.00)				
Federal Minerals			[a]175.00		
Rainbow Bridge NM	(461.00)				
Federal Minerals			[a]461.00		
USFS	367,006.41				
Manti-LaSal National Forest	(366,853.91)				
Federal Minerals		366,853.91			
Baker Ranger Station	(152.50)				
Federal Minerals			[c]152.50		
Navajo Indian Reservation	1,220,492.56				
Federal Minerals		51,606.78			
Indian Minerals			[b]1,168,885.78		
State Ownership	244,955.22				
State Lands Commission	(244,935.22)				
State Minerals				244,935.22	
State Parks	(20.00)				
Federal Minerals		20.00			

Private Indian Trust Lands	22,998.31				
Ute Indian Allotments	(12,297.43)				
Private Minerals			[b]12,297.43		
Navajo Indian Allotments	(10,700.88)				
Federal Oil and Gas		1,074.96			
Private Minerals			[b]9,625.92		
Private Ownership	335,155.99				
HUD	(40.00)				
State Minerals				40.00	
BLM	(61.89)				
Federal Minerals		61.89			
DOE	(79.54)				
Federal Minerals		79.54			
Ute Mountain Tribe	(840.00)				
Private Minerals					840.00
Navajo Tribe	(1,280.00)				
Private Minerals					1,280.00
Other Private Lands	(332,854.56)				
Federal Minerals		28,396.32			
Federal Oil and Gas		26,850.86			
Federal Other Minerals[d]		27,687.72			
State Minerals				67,154.12	
Private Minerals					182,765.54
TOTALS	4,538,978.04	2,538,069.79	1,493,382.39	320,000.32	187,525.54

NOTE: Split-estate lands are those where the surface estate and minerals estate are managed by different agencies. Federal minerals managed by BLM will be carried into the RMP; other totals are for information only.

[a] NPS (250,813.98 total)

[b] BIA (1,242,415.91 total)

[c] USFS (152.50 total)

[d] Includes all or some of the following: oil and gas, potash, sodium, phosphate, nitrogen, uranium, thorium, coal, or fissionable minerals.

Source: BLM Master Title Plats, December 1984.

TABLE 0-5

Management of Grazing and Recreation Resources (acres)

Public Resource	Administered by SJRA	Not Administered by SJRA
Livestock Grazing		
Public lands within SJRA	1,748,253.21	
Public lands in Grand RA	300.00	
Public lands in Colorado[a]	5,600.00	
NPS lands in GCNRA	312,656.38	
TOTAL	2,066,809.59	
Public lands by Grand RA		200.00
Public lands by Colorado[a]		10,200.00
Public lands not within an allotment[b]		20,540.00
TOTAL		30,940.00
Recreation		
Public lands	1,779,193.21	
San Juan River, Joint Management[c]	15,000.00	
TOTAL	1,794,193.21	

NOTE: Acres administered by SJRA will be carried into the RMP; other totals are for information only.

[a] Livestock grazing is manager under an MOU with BLM's Montrose District, Colorado, San Juan Resource Area.

[b] Includes acreage allotted to wildlife.

[c] Recreational use of the San Juan River from Mexican Hat to Clay Hills Crossing is managed jointly with GCNRA.

Source: BLM Grazing Case Files; BLM Master Title Plats, December 1984.

INFORMATION

1. Identification of Issues
2. Development of Planning Criteria
3. Inventory Data and Information Collection
4. Analysis of Management Situation

ANALYSIS

5. Formulation of Alternatives
6. Estimation of Effects of Alternatives
7. Selection of Preferred Alternative

DECISION

8. Selection of Resource Management Plan

IMPLEMENTATION

9. Monitoring and Evaluation

FIGURE 0-3

Prescribed Resource Management Planning Actions

PREPLANNING ANALYSIS

The preplanning analysis documents the first three steps of the planning process: identification of issues, development of preliminary planning criteria, and collection of inventory data and information. The scoping requirement for preparation of an EIS (found at 40 CFR 1501.7) is the equivalent of the identification of issues. The preplanning analysis also provides information pertaining to the preparation of future documents, team organization, and schedules. It serves to inform agency personnel, other governmental agencies, and the public of the planning effort, and is provided to the public as an information document. The preplanning analysis was prepared in November 1984 and approved by the State Director in January 1985. Copies are available at the district and resource area offices.

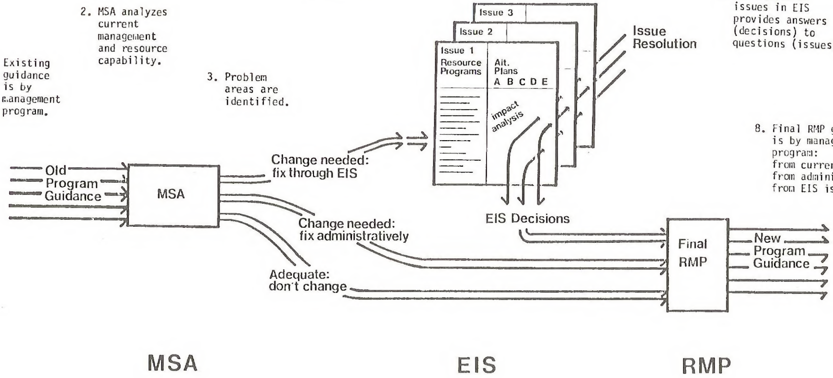
MANAGEMENT SITUATION ANALYSIS

The MSA documents the fourth planning step: analysis of the management situation. This is a shelf document, available for public inspection, but not specifically distributed for public review. It will be available at the SJRA, MDO, and USO. The MSA details the physical profile for base resources and facilities, and provides an analysis of resource management programs administered by the resource area. Existing management practices under the MFPs are described for each program, and the capability of the resource to meet present and future demands is analyzed. Current management practices that appear to be adequate, and where no management concerns or conflicts are identified, may be carried forward into the final plan virtually intact. Problems identified in the MSA are analyzed to determine first if they can be resolved administratively. Administrative changes may be formulated and carried into the RMP. Problems that involve establishing or adjusting land use or resource allocations will be carried through the EIS process for resolution. Figure 0-4 presents a schematic chart showing the purpose of the MSA and its relationship to the RMP and EIS.

RESOURCE MANAGEMENT PLAN/ENVIRONMENTAL IMPACT STATEMENT

Planning steps 5 through 7 are documented in the draft RMP/EIS: formulation of alternatives, estimation of effects of those alternatives, and selection of the preferred alternative. The No Action alternative described in the draft RMP is the current management under the four MFPs or subsequent planning documents and is described for each specific resource program in the MSA. Various alternatives are formulated to resolve the planning issues (problems or opportunities) identified in step 1. These are measured against the No Action alternative to estimate the differences in environmental effects. The draft EIS analyzes the alternatives and presents BLM's preferred alternative. The draft RMP/EIS is distributed for a formal public review and comment period.

After the public comments are analyzed, the proposed RMP and final EIS are written. The proposed RMP may differ from the earlier preferred alternative. The proposed RMP is reviewed by the Governor for consistency with state plans. The proposed RMP and final EIS are subject to public protest through a formal procedure (explained at 43 CFR 1610.5-2).


Old
Program
Guidance
MSA
Change needed:
fix through EIS
Change needed:
fix administratively
Adequate:
don't change
Issue 3
Issue 2
Issue 1
Resource
Programs
Alt.
Plans
A B C D E
impact
analysis
Issue
Resolution
EIS Decisions
Final
RMP
New
Program
Guidance
MSA
EIS
RMP

1. Existing guidance is by management program.

2. MSA analyzes current management and resource capability.

3. Problem areas are identified.

4. Issues outlined: Question (opportunity or constraint) on management of base resource.

5. RMP/EIS is "issue-driven." Alternatives and Analysis are grouped by issue.

6. Alternative resolution of issues measured against current management (from MSA).

7. Resolution of issues in EIS provides answers (decisions) to questions (issues).

8. Final RMP guidance is by management program:
from current situation
from administrative change
from EIS issue resolution.

FIGURE 0-4

Relationship Between the MSA and the RMP/EIS

RECORD OF DECISION/FINAL RESOURCE MANAGEMENT PLAN

To complete the documentation of the RMP/EIS, an ROD is published with the final RMP. This completes step 8. The ROD is not ordinarily subject to public review, but may be if the final RMP differs substantially from the proposed RMP. The final RMP provides resource management guidance, by program, that is taken either directly from the current management described in the MSA or from resolution of the planning issues through the EIS. Monitoring and evaluation of the final RMP, step 9, will follow a set schedule, and will be documented through plan supplements or addenda. An RPS is required by BLM policy to brief the public on range management decisions and monitoring by grazing allotment. To streamline procedures and reduce paperwork, the RPS will be combined with the ROD and final RMP.

PLANNING ASSUMPTIONS

Development of the MSA and the RMP is based on the following planning assumptions.

- The planning horizon will be 20 years. This period of time serves as a common base for establishing future conditions and effects and alternative actions that would influence the planning decision.

- The projection of future demands for public lands and resources is based on current conditions, and the year 2000 is used as a common point in time. This date falls within the scope of the planning horizon, yet is far enough from the anticipated implementation dates given in the RMP that alternative management actions would have had time to become effective.

- Funding and personnel will be sufficient to carry out any alternative selected.

- Management of lands administered by another federal agency, and management of SJRA lands by other agencies or BLM offices, will be in accordance with MOUs or other written agreements now in place.

- The plan will not address management of any uses of state or private lands or nonfederal minerals.

- The plan will assume continuation of existing patterns of state and federal land ownership at least until the year 2000. A plan amendment will be prepared if necessary in the event of land exchanges or state indemnity selections that would alter federal/state ownership, or if federal legislation is enacted to implement Project BOLD (UDNR, 1982), which would block up state and federal lands.

PRELIMINARY PLANNING CRITERIA

Planning criteria (planning step 2) are guidelines established to (1) structure development of the RMP; (2) tailor the RMP to the planning issues; (3) avoid unnecessary data collection; (4) avoid unnecessary analyses; and (5) guide estimation of the effects of the various alternatives considered in the EIS. The planning criteria guide agency and public review and explain what will be considered in the RMP/EIS.

The purposes of planning criteria vary at different stages of the planning process. Accordingly, separate preliminary criteria have been developed to guide the following steps: identification of problem areas in the MSA; formulation of alternatives; and estimation of the effects of alternatives (see table 0-6). These were documented in the Preplanning Analysis.

Draft planning criteria (based on the preliminary planning criteria) have been presented for a 30-day public review and comment period ending April 1, 1985. Accordingly, the preliminary criteria shown in table 0-6 are subject to change.

RMP/EIS ALTERNATIVES

A range of alternatives will be presented in the RMP/EIS to cover various management options available to the resource area manager. Alternative resolution of problems or opportunities identified in the MSA will form the basis of the EIS alternatives.

Alternative A will be the No Action alternative: current management of resource programs as described in the MSA and derived from the previous MFPs. The No Action alternative does not present a static situation, but instead projects impacts that would be expected over time if current management practices continued, given the present and anticipated future demands for the resource as projected in the MSA. This projection will serve as a baseline against which the impacts of other alternatives will be measured.

From three to five other alternatives (or subalternatives) will be presented to cover a range of management options. In accordance with planning regulations at 43 CFR 1610.4, the alternatives developed will reflect the variety of concerns, needs, resource uses, and development and protection opportunities covered by the planning issues. Each alternative will be feasible and reasonable, and will be developed by the interdisciplinary team to meet specified goals of protection, production, and use of resources managed by the BLM.

REQUIREMENTS FOR COLLECTION OF INVENTORY DATA AND OTHER INFORMATION

Inventory data and other information are collected as necessary over time to provide a basis for preparing and monitoring the RMP (planning step 3). New information may be collected to aid in analyzing alternatives and in making planning decisions, emphasizing those having the greatest potential impact (reference 43 CFR 1610.4-3).

TABLE 0-6

Draft Planning Criteria

Planning Criteria in FLPMA

FLPMA, at Section 202(c), provides that in the development and revision of land use plans, the Secretary of the Interior shall:

(1) use and observe the principles of multiple use and sustained yield;

(2) use an interdisciplinary approach to integrate consideration of physical, biological, economic, and other sciences;

(3) give priority to the designation of areas of critical environmental concern;

(4) rely on the inventory of public lands, their resources, and other values;

(5) consider present and potential uses of the public lands;

(6) consider the relative scarcity of the values involved and the availability of alternative means and sites for realization of those values;

(7) weigh long-term benefits to the public against short-term benefits;

(8) provide for compliance with applicable pollution control laws; and

(9) to the extent possible, coordinate land use inventory, planning, and management of public lands with the land use planning and management programs of other federal agencies and state and local governments.

At Section 302(b), FLPMA requires the Secretary to manage the public lands so as to prevent unnecessary or undue degradation of the lands.

Because these fundamental planning criteria are required by law, they are not repeated below.

Criteria for Problem Identification

Current resource management practices discussed in the MSA will be identified as problem areas if any of the following conditions occurs:

- management of one resource significantly constrains or curtails use of another resource;
- agency guidance requires land use allocations, which are not now in place, to be made through the planning process;
- existing land use allocations conflict with current agency resource management policies or guidance;
- existing resource management practices conflict with management plans, policies, and guidance of another federal surface management agency; or if
- documented public controversy regarding management of a specific resource value indicates a management concern.

Criteria for Alternative Formulation

The following criteria have been developed to guide formulation of a range of alternatives for each issue. Management concerns that do not fall under the issues are resolved in the MSA and carried through the EIS analysis as management actions common to all alternatives.

All alternatives formulated and assessed in the RMP/EIS will:

- be in accordance with all applicable laws, regulations, and agency policies;
- provide reasonable, feasible, and practical guidance for management of the public lands and resources, without requiring appreciable changes in facilities, services, or scope of management; and
- provide a complete management plan for the entire San Juan Resource Area.

At least one of the alternatives assessed in the RMP/EIS will provide for each of the following:

- continuing the present management;
- maximizing the production or extraction of renewable and nonrenewable resources;
- maximizing the development and use of the recreational resource, including motorized and nonmotorized pursuits;
- minimizing consumptive use of the grazing resource by domestic livestock;
- maximizing the protection of sensitive ecological or visual environments over extraction of renewable and nonrenewable resources;
- designation and protection of areas of critical environmental concern or other special ecological areas; and
- protection or enhancement of those values on public lands within the resource area which are relatively scarce within the public domain as a whole.

None of the alternatives assessed in the RMP/EIS will consider or provide for the following:

- the designation of public lands as wilderness (the assessment of effects of Congressional designation of wilderness is left to the statewide wilderness EIS);
- the designation of specific parcels of public lands as suitable for disposal through sales, exchange, state indemnity selections, or other means (these types of actions will be considered individually upon proper application; the RMP will be used as a guide to determine whether disposal would serve the national interest, and an RMP amendment will be prepared if necessary);

- the designation of specific parcels of public lands for special use permits, rights-of-way, utility corridors, special withdrawals, private Congressional bills, or Congressional withdrawals, whether application is made by another federal agency or by other entities (these types of actions will be considered individually upon proper application; an RMP amendment will be prepared if necessary); or

- the development of any coal resources through the unsuitability criteria at 43 CFR 3461. (Coal resources within the resource area are marginal and scattered; coal development is not believed to be economically viable within the next 10 years. If, in the future, coal resources are scheduled to be leased, or if public interest is expressed in development of coal resources, an unsuitability study will be made and the RMP amended, if necessary, as part of its periodic review.)

Criteria for Estimation of Effects

The estimation of effects of each alternative will include the following:

- the impact of management actions upon adjacent federal, private, or Indian lands;

- the formal land use plans of state and local governments and other federal agencies;

- short-term impacts, or those occurring within 2 years of completion of a given management action; long-term impacts, or those occurring thereafter; residual impacts, or those remaining 20 years after implementation of a management action; and cumulative impacts, or those which become significant when considered together;

- all local economic and social changes caused by each alternative, compared to the continuation of current management practices described in the No Action alternative; and

- the cost to the BLM of implementation, based on current conditions.

BLM personnel have compiled a data base for various resources; this has been supplemented by the work of private contractors and other government agencies. Budget constraints prevented collection of data specifically for the RMP. The data base and sources used are documented in the MSA.

Information will continue to be collected after adoption of the RMP. Remaining base data gaps are identified in the MSA, along with means to acquire the information over time.

SCOPE OF RMP ANALYSIS

The scope of analysis will examine possible site-specific impacts on certain resources, particularly livestock, along with impacts on broader aspects of the human environment, particularly socioeconomic resources. The impacts of each alternative will be analyzed for each resource management program.

In February 1985, a proposal was made by the Director, BLM and the Chief, USFS, for an interchange of administrative responsibilities. Under the preliminary proposal, the SJRA would assume administration of the portion of Manti-LaSal National Forest within the resource area boundaries under laws governing management of USFS lands. Because the proposal has not been officially sanctioned, because details of management responsibilities are not known, and because BLM would apparently adopt USFS management plans now in effect, the interchange is not addressed in the MSA. If the proposal goes into effect at a later date, the RMP would be amended to cover those management responsibilities.

The SJRA has been the focus of some past controversy in regard to the wilderness review and the testing proposed by the DOE to determine the potential feasibility of certain sites for a high-level nuclear waste repository. Neither topic will be addressed or analyzed in the RMP/EIS or in the MSA, for the following reasons.

The process leading to designation of WSAs has already been completed. No additional WSAs will be designated, and boundaries of existing WSAs will not be changed. In Utah, a statewide wilderness EIS is being prepared to assess impacts of wilderness designation and to present recommendations as to whether each WSA and ISA is suitable or nonsuitable for wilderness designation. The MSA and RMP/EIS will not discuss impacts of wilderness designation or suitability recommendations. The MSA will discuss constraints imposed by IMP on management of other resources, and the RMP/EIS will discuss management options for WSAs and ISAs if not designated as wilderness and released from IMP by Congress.

The impacts of specific proposals by the DOE for given sites studied under the Nuclear Waste Policy Act of 1982 would be addressed in site-specific environmental documents if proposals are made. At this time (March 1985) there are no specific proposals for study of any site within the SJRA for this purpose. If proposals are made and environmental effects are analyzed, a planning amendment may be necessary before any proposals can be approved or projects implemented. Because specific proposals have not been detailed at this time; because the proponent agency has the primary responsiblilty for environmental documentation; and because decisions regarding site characterization studies or waste repository locations are not made at the BLM resource area level, the MSA and the RMP/EIS will not analyze potential proposals or alternatives pertaining to a nuclear waste repository.

Under the planning regulations (at 43 CFR 1610.7-1), the RMP is to serve as the basis for any coal mining unsuitability study under SMCRA (reference 43 CFR 3461.1). The San Juan RMP will not review the unsuitability criteria because the coal resource in SJRA is not considered to be economically feasible for recovery, and because there has been no expression of interest in developing federal coal reserves present. If, in the future, interest is expressed in establishing a coal leasing program in SJRA (initiated by either the BLM, another agency, or a private concern) the unsuitability criteria will be applied, and the RMP will be amended accordingly.

The BLM is mandated by FLPMA to give priority to designation of ACECs; by regulation, areas having potential for designation as an ACEC will be identified and considered in the RMP process (43 CFR 1610.7-2). Suitable areas will be subject to extensive formal public review. Each resource management program described in Part II of the MSA includes a section documenting potential (or lack of potential) for ACEC designations within the SJRA.

PROGRAM GUIDANCE

Management of resource programs is governed by a series of laws, regulations, and instructions. These provide Congressional, Presidential, Departmental, and Bureau goals and objectives for resource management, and give procedures to be followed. Additional guidance is given by BLM's Washington office, the Denver Service Center, the State Director and the district office.

Mandates and authorities are given for each resource management program in the MSA. Besides these, several broad authorities pertain to management of public lands and resources, as follows:

NEPA of 1969, as amended, requires that agencies prepare EISs for federal actions expected to significantly affect the quality of the human environment. In addition, agencies are required to use a systematic, interdisciplinary approach in planning and decision making processes that will affect the environment.

FLPMA of 1976, as amended, provides for management of the public lands under principles of multiple use and sustained yield. The act specifically calls for the periodic and systematic inventory of public land resources; the development, maintenance, and revision of land use plans using an interdisciplinary approach; and compliance with various state and federal standards. The act further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands.

The annual appropriation act for the DOI and related agencies provides the conditions under which the BLM may use appropriated funds for the FY for which it was enacted. These conditions sometimes provide specific guidance for management of public lands and resources.

EO 11514, March 5, 1970, as amended by EO 11991, May 24, 1977, states that the Federal Government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. It provides for continuous monitoring, evaluation, and control of the activities of each federal agency so as to protect and enhance the quality of the environment. Agencies shall also develop programs and measures to protect and enhance environmental quality, exchange data and research results, and cooperate with other agencies to accomplish the goals of NEPA.

Within the BLM, agency guidance follows a hierarchy starting with the Director. The responsibilities described below are commensurate with those identified in approved functional statements (see BLM Manual Sections 1211, 1212, 1213, 1214, and 1216).

The Director and Associate Director are responsible for all aspects of policy analysis and formulation, and for resource program development in the Bureau. This responsibility is exercised through the Deputy Director for Lands and Renewable Resources and the Assistant Director for Renewable Resources.

The Service Center Director is responsible for providing technical support, upon request from the Washington office or from state directors and their staffs.

State directors are responsible for formulating policy (within limits delegated by the Director) and for developing, directing, and coordinating statewide resource management programs.

District managers are responsible for formulating policy (within limits delegated by state directors) and for developing, directing, and coordinating districtwide resource management programs.

Resource area managers are responsible for implementing district, state and Bureau resource management policies and programs within their designated areas of jurisdiction.

PART I
PHYSICAL PROFILE

CLIMATE

LIST OF OVERLAYS

None; the data fit into the figures and tables, which are part of the narrative.

RESOURCE OVERVIEW

REGIONAL INFLUENCES

Utah's temperatures and precipitation levels vary greatly with the changing altitude and latitude. Mountain barriers also play a major role in climatic variation. The coastal ranges of the Cascades and the Sierras to the west and the upthrust of the Rockies to the east are significant barriers. These barriers often protect the region from the temperature extremes of the Great Plains and the moist air masses from the Pacific. The prevailing wind is westerly. Utah's temperate latitude is characterized by winter weather arriving from the Gulf of Alaska and summer weather arriving from the Gulf of Mexico (Brough, et al., 1983).

In winter, the coastal ranges cause much of the low-level moisture to be deposited on the west coast. This lessens precipitation in the lower Utah valleys, while allowing significant accumulation of snow in higher mountain regions. Temperatures above 100 degrees F occur during the summer, but low humidity decreases the temperature impact. Sub-zero temperatures occur in winter, varying with elevation, but prolonged periods of extemely cold temperatures are rare. The weather balance is distinctly seasonal, but without the extremes associated with humid or geographically exposed regions.

Areas in the state below the mountains or high plateaus, and the lower mesas of southern Utah, generally receive less than 10 inches of moisture yearly. This aridity necessitates irrigation for row crops or fallow agriculture for beans and small grains. Winter snows, accumulated in the high mountains, provide the critical water for municipal and industrial use and for summer irrigation of orchards, vineyards, row crops, and alfalfa for winter stock feed.

Sunshine is normally abundant. The average daily accumulation of solar energy ranges from about 400 langleys (gram calories per square centimeter) in northern Utah to about 500 langleys in the extreme southwestern portion (Brough, et al., 1983). The variation is consistent year-round with sunshine more prevalent in the southern part of the state.

Utah is divided into seven general weather areas (figure PP-1). The SJRA is in the southeastern corner of Utah (figure PP-2). It is also the southeast corner of the Southeast Weather Region (Brough, et al., 1983). As data elsewhere illuminate, the area is sparsely settled with population concentrated at Monticello, Blanding, Bluff, and Mexican Hat.

The climatological data for the SJRA in the remainder of this segment (unless otherwise specified) is summarized from Rykaczewski, 1981. Tables and figures are also reproduced from that study.

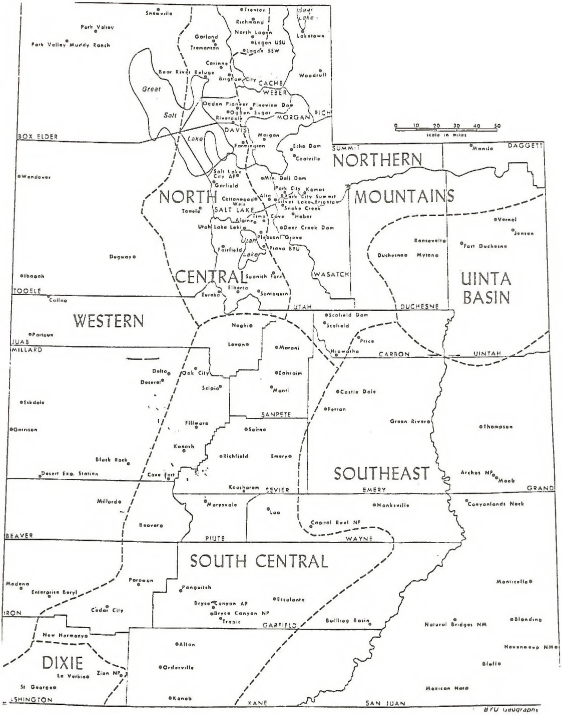
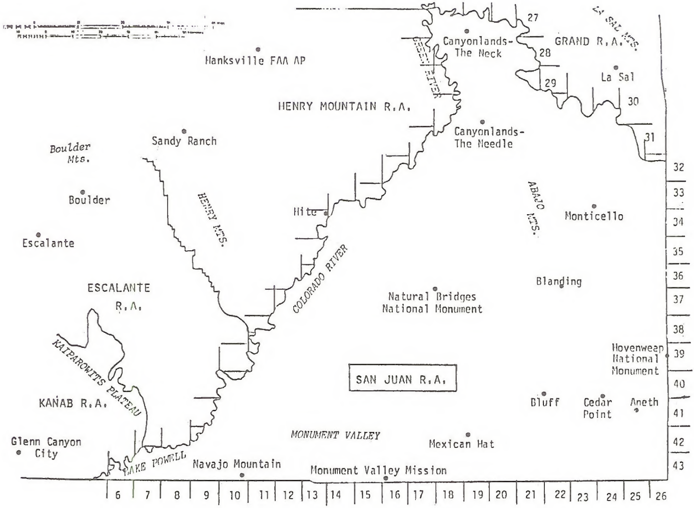

NORTHERN MOUNTAINS
NORTH CENTRAL
UINTA BASIN
WESTERN
SOUTHEAST
SOUTH CENTRAL
DIXIE
Great Salt Lake
Bear Lake
Utah Lake
BOX ELDER
CACHE
WEBER
RICH
MORGAN
DAVIS
SUMMIT
DAGGETT
SALT LAKE
TOOELE
WASATCH
UTAH
DUCHESNE
UINTAH
JUAB
MILLARD
SANPETE
CARBON
SEVIER
EMERY
GRAND
BEAVER
PIUTE
WAYNE
IRON
GARFIELD
WASHINGTON
KANE
SAN JUAN
0 10 20 30 40 50
scale in miles
Snowville
Park Valley
Park Valley Muddy Ranch
Trenton
Richmond
North Logan
Logan USU
Logan SSW
Laketown
Garland
Tremonton
Corinne
Bear River Refuge
Brigham City
Woodruff
Ogden Pioneer
Pineview Dam
Ogden Sugar
Riverdale
Morgan
Farmington
Echo Dam
Coalville
Manila
Wendover
Salt Lake City AP
Garfield
Mtn. Dell Dam
Park City
Kamas
Park City Summit
Alta
Silver Lake Brighton
Cottonwood Weir
Snake Creek
Heber
Tooele
Timp Cave
Alpine
Utah Lake Lehi
Deer Creek Dam
Pleasant Grove
Provo BYU
Fairfield
Vernal
Jensen
Roosevelt
Fort Duchesne
Duchesne
Myton
Dugway
Ibapah
Spanish Fork
Elberta
Eureka
Santaquin
Callao
Scofield Dam
Scofield
Price
Nephi
Partoun
Levan
Moroni
Hiawatha
Delta
Oak City
Deseret
Ephraim
Scipio
Manti
Castle Dale
Eskdale
Ferron
Fillmore
Salina
Green River
Thompson
Garrison
Kanosh
Richfield
Emery
Black Rock
Desert Exp. Station
Cove Fort
Arches NP
Moab
Koosharem
Marysvale
Loa
Hanksville
Canyonlands Neck
Milford
Beaver
Capitol Reef NP
Parowan
Modena
Enterprise Beryl
Panguitch
Monticello
Bryce Canyon AP
Escalante
Cedar City
Bryce Canyon NP
Tropic
Bullfrog Basin
Natural Bridges NM
Blanding
New Harmony
Alton
Hovenweep NM
Orderville
Bluff
La Verkin
Zion NP
St. George
Mexican Hat
Kanab
BYU Geography

FIGURE PP-1

Utah Weather Stations


Canyonlands-
The Neck
GRAND R.A.
LA SAL MTS.
27
28
29
30
31
La Sal
Hanksville FAA AP
HENRY MOUNTAIN R.A.
GREEN RIVER
Canyonlands-
The Needle
Sandy Ranch
Boulder
Mts.
Boulder
Escalante
HENRY MTS.
Hite
COLORADO RIVER
ABAJO MTS.
Monticello
32
33
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39
40
41
42
43
ESCALANTE
R.A.
Blanding
Natural Bridges
National Monument
KAIPAROWITS PLATEAU
Hovenweep
National
Monument
SAN JUAN R.A.
KANAB R.A.
Bluff
Cedar
Point
Aneth
Glenn Canyon
City
MONUMENT VALLEY
Mexican Hat
LAKE POWELL
Navajo Mountain
Monument Valley Mission
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FIGURE PP-2

Stations Recording Climate Data In and Near the SJRA

SEASONAL AND TOPOGRAPHIC VARIATIONS

The weather in the resource area relates primarily to elevation. On the high slopes and crests of the Abajo Mountains, the growing season is short and winter snows abundant. On lower slopes and high plateaus, the growing season lengthens, and snowfall and snowpack decline. In the low valleys and cultivated mesaland, the growing season (figure PP-3) (table PP-1) is ample for row crops, and snowfalls are infrequent.

May and October are transition months between summer and winter and tend to be wetter than other months. Thunderstorms are common in summer. Brief, intense storms result from the influx of warm, moist air from the Gulf of Mexico. These storms provide little useful moisture and frequently cause considerable damage to crops, significant erosion, and threat to life and property.

TEMPERATURES

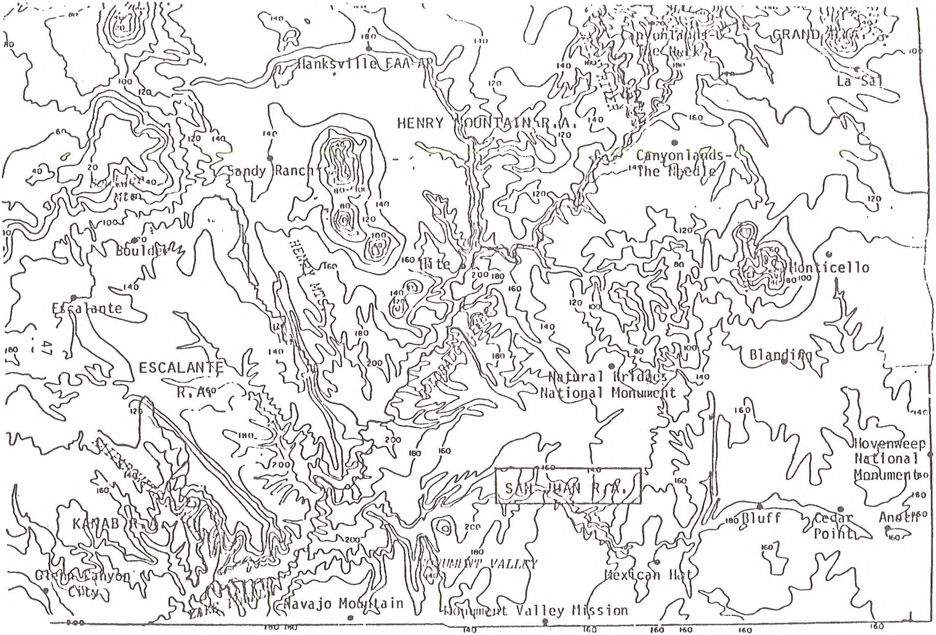
Annual average temperatures vary from 46 to 50 degrees F. Mexican Hat, on the San Juan River, has the highest average temperature, while LaSal (on the slope of the LaSal Mountains) and Monticello (on the slope of the Abajo Mountains) record the lowest annual values (table PP-2). A daily temperature range of 8 to 13 degrees F from the average is seen in January; a range of 14 to 20 degrees F from the average is seen in June. The lowest recorded temperature of -27 degrees F occurred in LaSal. A record high of 113 degrees F occurred at both Bluff and Mexican Hat.

PRECIPITATION

Figure PP-2 is a base map showing the stations from which precipitation data have been utilized. Annual precipitation averages for each of these stations are shown in figure PP-4. The data show that annual rainfall in the resource area ranges from 6 to 30 inches per year. Highest values occur in the Abajo Mountains, generally 20 to 30 inches. A secondary maximum area, about 20 inches, is seen in the high plateau area near Natural Bridges National Monument. In the Monument Valley area, precipitation averages range from 6 inches near the southern border of the resource area (state border) to about 12 inches on the periphery of the San Juan River, with up to 16 inches around Navajo Mountain.

The average precipitation for the public land portion of the resource area is 8 to 12 inches per year. Table PP-3 details monthly means and extremes as well as total annual values.

Utah's wettest year of record since 1899 occurred in 1982, and was also a record year at many weather stations. The Salt Lake City airport, for example, accumulated 22.86 inches (Brough, et al., 1983). The state's driest calendar year was 1976, when precipitation over the entire state averaged 7.70 inches. The previous low, in 1966, was 8.79 inches. The drought extended into 1977 causing depletion of reservoirs and wells.


Hanksville FAA AP
Canyonlands-The Neck
GRAND
La Sal
HENRY MOUNTAIN R.A.
Sandy Ranch
Canyonlands-The Needle
Boulder Mtn
Boulder
Hite
Monticello
Escalante
HENRY MTS
ESCALANTE R.A.
COLORADO RIVER
Blanding
Natural Bridges National Monument
SAN JUAN R.A.
Hovenweep National Monument
KANAB R.A.
Bluff
Cedar Point
Aneth
MONUMENT VALLEY
Glen Canyon City
Mexican Hat
Navajo Mountain
Monument Valley Mission
47
20
40
60
80
100
120
140
160
180
200

Source: Rykaczewski, 1981

NOTE: 32-degree F freeze-free season; values for data-sparse regions were estimated based on topography and other climatic data.

FIGURE PP-3

Freeze-Free Season

TABLE PP-1

Frost-Free Period or Length of Growing Season In and Near the SJRA

Station, Period of Record, and Elevation in Feet	Temperature (Degrees F)	Date of Last Spring Occurrence	Date of First Fall Occurrence	Average Length of Growing Season (Days)
Blanding	32	5/18	10/14	148
1924-1950	28	4/30	10/24	178
6,026	24	4/09	11/04	208
	20	3/29	11/12	228
	16	3/16	11/19	248
Bluff	32	4/17	10/25	190
1928-1950	28	4/01	11/05	218
4,320	24	3/20	11/12	237
	20	2/23	11/24	274
	16	2/03	12/04	304
Monticello	32	5/23	10/08	138
1931-1950	28	5/04	10/20	168
7,066	24	4/21	10/27	189
	20	4/10	11/06	210
	16	3/29	11/14	229
Moab	32	4/18	10/18	183
1923-1950	28	4/03	10/26	206
3,970	24	3/27	11/08	226
	20	3/16	11/15	245
	16	2/19	11/30	235
Hanksville AP	32	5/01	10/04	156
1927-1950	28	4/17	10/16	182
4,460	24	4/09	10/27	201
	20	4/01	11/05	218
	16	3/20	11/14	239

NOTE: Data for Moab and Hanksville are representative of the SJRA.

Source: National Climatic Center

TABLE PP-2

Temperature Distribution (degrees F)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
ANETH PLANT (1961 - 1970) 4560'													
Ext Max	59	67	81	87	96	106	107	106	100	90	76	62	107
Mean Max	39	52	61	69	82	91	96	94	83	71	57	40	70
Mean Avg	28	40	46	54	65	74	81	79	69	57	44	30	56
Mean Min	16	28	32	38	49	58	66	63	56	43	32	20	42
Ext Min	-8	9	18	15	22	40	50	48	35	21	20	-13	-13
BLANDING (1909 - 1970) 6026'													
Ext Max	62	67	78	85	92	100	103	101	95	90	71	65	103
Mean Max	38	44	52	61	72	82	88	85	78	66	52	40	63
Mean Avg	27	33	39	48	56	66	72	70	62	52	39	29	50
Mean Min	16	21	27	34	41	50	57	56	48	37	26	18	36
Ext Min	-20	-23	2	10	22	28	36	38	20	12	-7	-8	-23
BLUFF (1920 - 1970) 4320'													
Ext Max	69	72	84	94	99	106	109	106	100	90	85	69	109
Mean Max	42	51	60	70	80	91	96	93	86	72	56	44	70
Mean Avg	30	38	46	55	64	73	80	77	69	56	42	32	55
Mean Min	18	25	31	39	48	55	63	61	51	39	28	20	40
Ext Min	-22	-13	9	18	23	35	40	38	29	16	-1	-20	-22
CANYONLANDS-THE NECK (1965 - 1970) 5900'													
Ext Max	54	60	72	81	97	100	99	100	91	86	70	54	100
Mean Max	37	44	53	61	74	83	91	89	79	66	51	39	65
Mean Avg	28	35	42	49	63	70	78	76	66	55	42	31	54
Mean Min	20	26	31	38	50	57	65	63	54	43	34	22	42
Ext Min	1	0	0	20	30	38	54	41	31	25	15	4	0
CANYONLANDS-THE NEEDLE (1965 - 1970) 5040'													
Ext Max	60	65	76	85	95	105	102	103	96	84	71	61	105
Mean Max	40	49	58	66	80	88	95	93	83	69	56	42	69
Mean Avg	28	36	44	51	63	71	78	76	66	53	42	30	53
Mean Min	15	23	29	35	45	54	62	60	49	37	28	17	38
Ext Min	-7	-2	12	19	22	38	41	40	30	19	9	-11	-11
CEDAR POINT (1960 - 1970) 6780'													
Ext Max	58	64	70	76	88	98	97	96	90	82	69	60	98
Mean Max	38	41	46	58	70	81	88	84	77	63	49	38	62
Mean Avg	26	29	35	44	54	64	71	67	60	49	36	27	48
Mean Min	15	17	23	30	39	47	53	54	43	35	24	16	34
Ext Min	-5	-5	-8	8	19	29	37	34	28	8	-6	-7	-8
HOVENWEEP NAT MON (1961 - 1970) 5000'													
Ext Max	60	64	78	85	92	103	103	105	95	90	70	60	105
Mean Max	39	49	56	66	78	88	95	92	82	71	55	41	67
Mean Avg	26	35	40	49	60	69	77	74	65	53	41	28	51
Mean Min	12	22	25	32	42	49	59	57	47	36	27	15	35
Ext Min	-21	-2	2	13	19	26	44	38	29	17	9	-23	-23
MEXICAN HAT (1947 - 1970) 4270'													
Ext Max	65	78	81	90	104	109	109	107	103	94	82	64	109
Mean Max	44	54	62	72	83	93	99	95	88	75	58	46	73
Mean Avg	31	40	46	56	66	75	83	80	70	58	44	33	57
Mean Min	19	25	30	39	49	58	67	64	54	41	29	21	41
Ext Min	-17	3	12	20	28	40	51	46	9	20	11	-10	-17

TABLE PP-2 (Concluded)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
MONTICELLO (1919 - 1970) 7066'													
Ext Max	54	60	69	79	85	97	96	101	91	83	70	62	101
Mean Max	36	40	46	57	67	77	83	80	73	62	49	38	59
Mean Avg	25	29	35	44	53	61	68	66	59	49	37	28	46
Mean Min	14	18	24	31	39	47	54	52	45	35	24	17	33
Ext Min	-15	-21	-2	4	14	27	35	34	21	11	-8	-13	-21
MONUMENT VALLEY MISSION (1961 - 1970) 5220'													
Ext Max	64	64	76	84	93	101	106	105	95	87	73	61	106
Mean Max	41	50	57	65	78	85	93	90	82	71	56	42	68
Mean Avg	32	40	45	53	66	72	81	78	70	58	46	34	57
Mean Min	22	29	34	40	53	59	68	66	58	46	36	26	46
Ext Min	-11	7	17	25	28	38	47	49	40	25	13	1	-11
NATURAL BRIDGES NATL MON (1965 - 1970) 6500'													
Ext Max	57	62	72	78	92	101	100	99	92	83	69	58	101
Mean Max	40	46	51	61	76	83	91	87	78	65	52	40	65
Mean Avg	29	34	37	46	60	67	75	72	63	52	41	29	51
Mean Min	17	21	24	31	43	51	59	54	48	38	30	18	37
Ext Min	0	2	7	16	26	35	46	40	30	18	14	-2	-2
NAVAJO MOUNTAIN (1961 - 1970) 6020'													
Ext Max	61	98	69	79	88	99	99	100	91	90	70	59	100
Mean Max	39	47	50	62	72	82	89	88	79	68	55	41	63
Mean Avg	27	35	38	47	58	65	74	73	64	53	41	28	49
Mean Min	15	22	25	33	43	48	59	58	49	38	28	16	35
Ext Min	-25	-3	2	7	17	25	40	40	30	12	5	-11	-25
LA SAL (1916 - 1970) 6975'													
Ext Max	60	64	72	82	91	95	101	98	91	85	75	65	101
Mean Max	36	40	47	57	67	77	83	81	73	62	48	39	59
Mean Avg	25	28	35	44	53	62	69	67	59	49	36	26	46
Mean Min	7	17	23	31	39	48	54	53	45	34	24	15	33
Ext Min	-22	-27	-10	-1	19	22	34	35	19	0	-7	-22	-27
MOAB 4 NW (1895 - 1970) 3970'													
Ext Max	67	78	88	97	102	113	111	108	104	94	82	68	113
Mean Max	42	50	61	72	82	92	97	94	86	73	57	44	71
Mean Avg	29	37	47	56	65	73	80	77	68	56	42	32	55
Mean Min	17	24	32	40	48	55	62	60	51	39	28	20	40
Ext Min	-24	-13	8	15	27	36	43	40	28	15	0	-18	-24
GLEN CANYON CITY (1962 - 1970) 4160'													
Ext Max	64	72	80	87	98	107	106	107	99	92	75	66	107
Mean Max	43	53	61	69	82	90	98	96	87	75	58	45	71
Mean Avg	32	41	46	54	65	74	82	80	71	59	46	34	57
Mean Min	20	28	32	38	49	57	67	65	55	44	33	22	42
Ext Min	-6	11	15	26	28	38	53	46	37	22	13	-1	-6

NOTE: LaSal, Moab, and Glen Canyon City are representative of the SJRA.

Source: Rykaczewski, 1981.

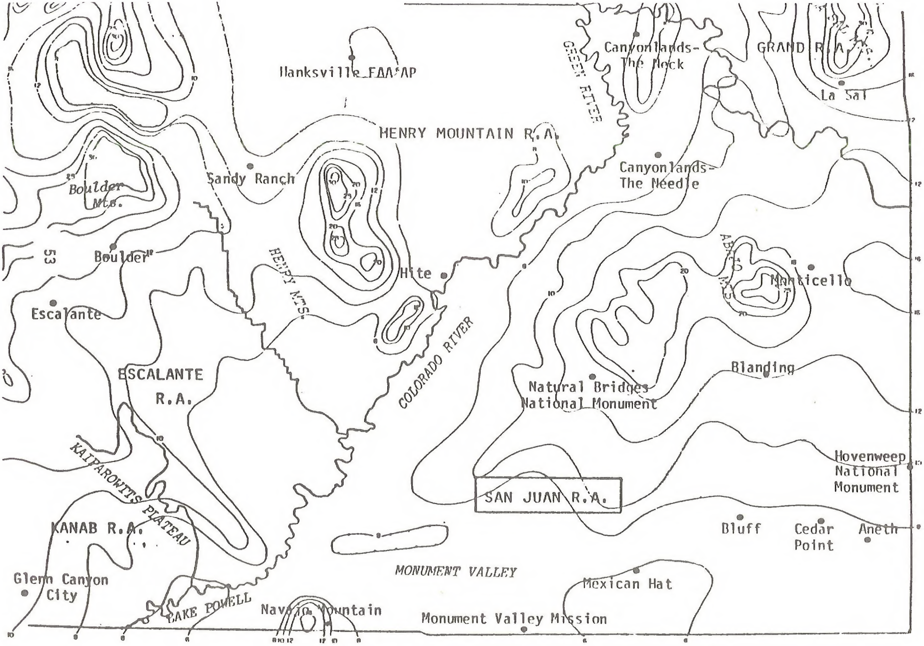

Hanksville FAA AP
Canyonlands-
The Neck
GRAND R.A.
La Sal
GREEN RIVER
HENRY MOUNTAIN R.A.
Canyonlands-
The Needle
Sandy Ranch
Boulder
Mts.
Boulder
53
Escalante
HENRY MTS.
Hite
COLORADO RIVER
ABAJO MTS.
Monticello
ESCALANTE
R.A.
Blanding
Natural Bridges
National Monument
KAIPAROWITS PLATEAU
Hovenweep
National
Monument
SAN JUAN R.A.
KANAB R.A.
Bluff
Cedar
Point
Aneth
MONUMENT VALLEY
Glenn Canyon
City
Mexican Hat
LAKE POWELL
Navajo Mountain
Monument Valley Mission

FIGURE PP-4

Normal Annual Precipitation

TABLE PP-3

Means and Extremes of Precipitation for the Freeze-Free Season

	Temp. (°F)	Date of Last Spring Occurrence	Date of First Fall Occurrence	Ave. Length of Growing Season	Precipitation During Growing Season (Inches) Maximum	Mean	Minimum
BLANDING (1924 - 1950) 6026'							
	32	05/18	10/14	148	6.83	5.02	3.31
	28	04/30	10/24	178	7.90	5.62	3.98
	24	04/09	11/04	208	9.36	6.61	3.98
	20	03/29	11/12	228	11.08	7.29	4.97
	16	03/16	11/19	248	11.08	7.29	4.97
BLUFF (1928 - 1950) 4320'							
	32	04/17	10/25	190	6.04	3.61	1.51
	28	04/01	11/05	218	6.38	4.50	1.89
	24	03/20	11/12	237	6.74	4.95	2.36
	20	02/23	11/24	274	7.53	5.60	2.70
	16	02/03	12/04	304	8.94	6.22	3.23
MONTICELLO (1931 - 1950) 7066'							
	32	05/23	10/08	138	8.48	6.20	4.54
	28	05/04	10/20	168	8.48	6.20	4.54
	24	04/21	10/27	189	10.68	7.02	4.72
	20	04/10	11/06	210	11.78	8.14	5.61
	16	03/29	11/14	229	13.78	9.02	6.33
HANKSVILLE FAA AP (1927 - 1950) 4460'							
	32	05/01	10/04	156	4.27	2.71	0.93
	28	04/17	10/16	182	4.82	3.06	1.24
	24	04/09	10/27	201	4.82	3.06	1.24
	20	04/01	11/05	218	5.10	3.49	1.24
	16	03/20	11/14	239	6.32	3.99	2.08
MOAB 4 NW (1923 - 1950) 3970'							
	32	04/18	10/18	183	6.08	3.94	1.59
	28	04/03	10/26	206	6.08	3.94	1.59
	24	03/27	11/08	226	8.91	5.48	2.97
	20	03/16	11/15	245	8.91	5.48	2.97
	16	02/19	11/30	235	10.37	6.60	4.13

NOTE: Hanksville and Moab are representative of the SJRA.

Source: Rykaczewski, 1981.

Seasonal snowfall means and extremes are provided in table PP-4. Roughly translated, 12 inches of snow equals 1 inch liquid precipitation. The extreme deviation in monthly and annual amounts is quite evident. Annual totals at Cedar Point, for example, have ranged from 11 to 83 inches, while average values are a more modest 51 inches. Average annual snowfall amounts are provided in figure PP-5. The figure emphasizes the influence of topography in determining amounts. The Abajo Mountains display values up to 70 inches, while the lower elevations receive only 10 to 40 inches.

Table PP-5 provides the number of days with 1 inch or more of snow cover. The stations at higher elevations have a greater number of snow cover days. Monticello (above 7,000 feet) experiences 70 days of 1 inch or more cover, while other areas typically have fewer than 50 days with 1 inch of cover. The data do not specify days of continuous cover. Lower elevations would show no-cover gaps thoughout the winter season.

A study by Robert Edwards (1978) demonstrated an annual precipitation differential (gain/loss) of 2.59 inches per 1,000 feet of change in elevation. It also estimated the moisture distribution for selected areas as follows:

Location	Elevation (feet)	Percent Snow	Percent Rain
Monticello	7,100	33	67
Natural Bridges	6,200	25	75
Hovenweep	5,200	15	85
Bluff	4,400	10	90
Mexican Hat	4,200	10	90

EFFECTS ON MANAGEMENT DECISIONS

These variations confirm topographical as opposed to lineal variations of temperature, growing season and climate. This, in turn, indicates that settlement and use patterns are tied to surface water, snow-fed streams, and beneficial growing season moisture. At best, the water/need margin is tight. Small variations in the amount or time of moisture create multiplier impacts on agriculture and range health. Given the small margin of wet years, recovery from dry periods can be slow.

Precipitation during the growing season is an important parameter in land management decisions. For example, ample rainfall at necessary stages is essential to revegetation of disturbed areas. Given a dry cycle, regrowth or revegetation will be negligible.

Average May to September rainfall has been analyzed in figure PP-6. The data show that about half of the annual precipitation falls between May and September. A predictably lower percentage of rain falls in the Abajo Mountains or near Navajo Mountain, where snowfall accounts for the larger portion. Table PP-6 provides means and extremes of precipitation for the potential growing season.

TABLE PP-4

Seasonal Snowfall Means and Extremes (inches)

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANNUAL	+ MAX MONTHLY DEPTH	PERIOD OF RECORD
ANETH PLANT 4650'															
Ext Max	0.0	0.0	0.0	0.0	0.0	10.0	4.0	0.9	3.0	0.0	0.0	0.0	10.0		1961 - 70
Mean Avg	0.0	0.0	0.0	0.0	0.0	4.0	2.0	0.3	0.5	0.0	0.0	0.0	6.8	3.0	1961 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1961 - 70
BLANDING 6026'															
Ext Max	0.0	0.0	0.0	1.3	11.0	29.0	36.8	22.0	17.9	15.2	1.6	0.0	59.5		1951 - 74
Mean Avg	0.0	0.0	0.0	0.1	4.1	10.0	9.0	6.3	5.1	2.0	0.1	0.0	36.7	18.0	1951 - 74
Ext Min	0.0	0.0	0.0	0.0	0.0	T	0.0	0.0	0.0	0.0	0.0	0.0	3.2		1951 - 74
BLUFF 4320'															
Ext Max	0.0	0.0	0.0	4.0	4.0	19.0	21.0	9.0	8.0	T	0.0	0.0	21.0		1951 - 74
Mean Avg	0.0	0.0	0.0	0.2	0.4	4.2	3.5	1.2	0.5	0.0	0.0	0.0	10.0	7.0	1951 - 74
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1951 - 74
CANYONLANDS-THE NECK 5900'															
Ext Max	0.0	0.0	0.0	5.8	3.1	25.0	3.8	13.0	8.3	4.5	0.0	0.0	32.8		1965 - 70
Mean Avg	0.0	0.0	0.0	1.3	1.7	8.6	2.4	3.6	4.0	0.9	0.0	0.0	22.5	21.0	1965 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	12.5		1965 - 70
CANYONLANDS-THE NEEDLE 5040'															
Ext Max	0.0	0.0	0.0	0.0	3.0	13.0	6.0	10.0	3.0	1.5	0.0	0.0	27.4		1965 - 70
Mean Avg	0.0	0.0	0.0	0.0	1.2	6.7	2.1	2.8	1.1	0.3	0.0	0.0	14.2	12.0	1965 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5		1965 - 70
CEDAR POINT 6780'															
Ext Max	0.0	0.0	0.0	7.0	12.0	39.0	10.0	33.0	30.0	12.0	0.5	0.0	83.2		1961 - 70
Mean Avg	0.0	0.0	0.0	1.7	4.4	16.0	7.0	7.9	11.4	2.2	0.1	0.0	50.7	30.0	1961 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0	10.5		1961 - 70
HOVENWEEP NAT MON 5000'															
Ext Max	0.0	0.0	0.0	1.0	2.5	22.6	9.5	10.1	14.0	1.5	0.0	0.0	41.1		1961 - 70
Mean Avg	0.0	0.0	0.0	0.1	0.9	8.3	3.3	3.2	4.4	0.3	0.0	0.0	20.5	10.0	1961 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	10.7		1961 - 70
MEXICAN HAT 4270'															
Ext Max	0.0	0.0	0.0	0.0	5.8	6.0	9.0	0.5	0.1	T	0.0	0.0	9.0		1951 - 70
Mean Avg	0.0	0.0	T	T	0.8	1.2	2.4	0.3	0.1	T	0.0	0.0	5.8	4.0	1947 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1951 - 70
MONTICELLO 7066'															
Ext Max	0.0	0.0	0.0	6.5	17.0	47.5	19.0	23.0	33.9	8.0	0.0	0.0	78.0		1961 - 70
Mean Avg	0.0	0.0	0.0	1.2	4.2	13.4	9.3	7.2	11.8	2.6	0.0	0.0	49.7	46.0	1961 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	3.0	1.5	0.0	0.0	0.0	0.0	0.0	26.0		1961 - 70
MONUMENT VALLEY MISSION 5220'															
Ext Max	0.0	0.0	0.0	2.5	6.7	29.0	5.7	4.5	4.0	0.0	0.0	0.0	29.0		1961 - 70
Mean Avg	0.0	0.0	0.0	0.3	0.7	5.8	2.4	1.8	1.5	0.0	0.0	0.0	12.5	5.0	1961 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.5		1961 - 70
NATURAL BRIDGES NATL MOUN 6500'															
Ext Max	0.0	0.0	0.0	0.0	5.6	40.2	17.0	30.5	21.0	11.0	0.3	0.0	98.5		1965 - 70
Mean Avg	0.0	0.0	0.0	0.0	3.4	20.2	6.8	16.6	12.7	4.4	0.1	0.0	64.2	18.0	1965 - 70
Ext Min	0.0	0.0	0.0	0.0	1.6	9.5	2.6	0.1	2.0	0.0	0.0	0.0	24.3		1965 - 70

TABLE PP-4 (Concluded)

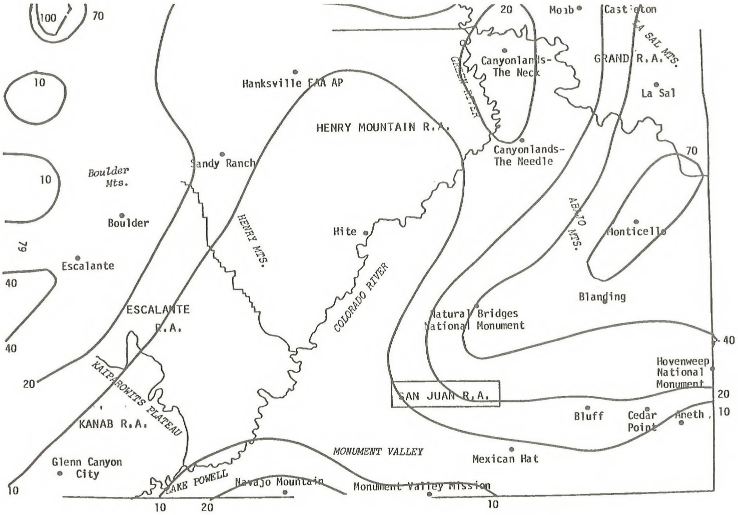
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANNUAL	+ MAX MONTHLY DEPTH	PERIOD OF RECORD
NAVAJO MOUNTAIN 6020'															
Ext Max	0.0	0.0	0.0	7.0	9.0	16.0	21.0	45.0	50.1	17.4	8.0	0.0	61.0		1961 - 70
Mean Avg	0.0	0.0	0.0	1.2	1.8	6.6	8.6	9.4	12.5	3.2	1.0	0.0	44.3	14.0	1961 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	2.5		1961 - 70
GLEN CANYON CITY 4160'															
Ext Max	0.0	0.0	0.0	0.0	3.5	19.0	1.8	6.1	1.7	0.3	0.0	0.0	19.0		1962 - 70
Mean Avg	0.0	0.0	0.0	0.0	0.4	4.0	0.5	1.0	0.2	0.0	0.0	0.0	6.1	8.0	1962 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1962 - 70
LOA 7045'															
Ext Max	0.0	0.0	0.0	6.0	12.0	9.5	17.0	13.0	11.7	10.0	5.0	0.0	43.0		1951 - 70
Mean Avg	0.0	0.0	T	1.2	3.3	5.0	5.2	4.8	4.8	2.9	0.7	T	28.0	8.0	1950 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	11.0		1951 - 70
MOAB 4 NW 3970'															
Ext Max	T	0.0	0.0	0.0	4.0	2.5	7.7	0.8	2.0	0.0	T	0.0	9.5		1951 - 70
Mean Avg	T	0.0	0.0	0.1	0.8	3.2	3.8	1.9	1.0	0.2	T	0.0	11.1	2.0	1898 - 70
Ext Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		1951 - 70

NOTE: Glen Canyon City, Loa, and Moab are representative of the SJRA.

T = Trace = less than 0.01 inch.

+ = Period of record for all annual maximum and minimum values varies slightly but falls within the years 1961 - 1970.

Source: Rykaczewski, 1981.


100
70
10
10
79
40
40
20
10
Boulder Mts.
Boulder
Escalante
ESCALANTE R.A.
KAIPAROWITS PLATEAU
KANAB R.A.
Glenn Canyon City
Hanksville FAA AP
Sandy Ranch
HENRY MTS.
HENRY MOUNTAIN R.A.
Hite
COLORADO RIVER
LAKE POWELL
Navajo Mountain
MONUMENT VALLEY
Monument Valley Mission
10
20
10
20
Moab
Castleton
LA SAL MTS.
GRAND R.A.
La Sal
GREEN RIVER
Canyonlands-The Neck
Canyonlands-The Needle
70
ABAJO MTS.
Monticello
Blanding
Natural Bridges National Monument
40
Hovenweep National Monument
SAN JUAN R.A.
20
10
Bluff
Cedar Point
Aneth
Mexican Hat

Source: Rykaczewski, 1981.

FIGURE PP-5

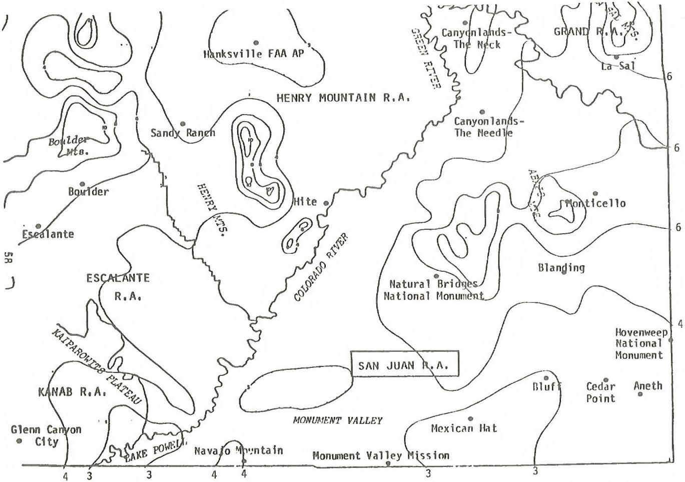
Average Annual Snowfall (inches)

TABLE PP-5

Annual Number of Days with 1 Inch or More of Snow Cover In and Near the SJRA

Period of Record	Station	Elevation (Feet)	Average
1962-1970	Blanding	6026	37
1966-1969	Bluff	4320	4
1964-1970	Cedar Point	6780	41
1968-1969	Mexican Hat	4270	4
1962-1970	Monticello	7066	74
1965-1970	La Sal	6975	31
1962-1970	Hanksville FAA AP	4456	20

Source: Rykaczewski, 1981.


Canyonlands-
The Neck
GRAND R.A.
LA SAL MTS.
La Sal
GREEN RIVER
Hanksville FAA AP
HENRY MOUNTAIN R.A.
Canyonlands-
The Needle
Sandy Ranch
Boulder
Mts.
Boulder
Escalante
HENRY MTS.
Hite
ABAJO MTS.
Monticello
COLORADO RIVER
ESCALANTE
R.A.
Blanding
Natural Bridges
National Monument
Hovenweep
National
Monument
KAIPAROWITS PLATEAU
SAN JUAN R.A.
KANAB R.A.
Bluff
Cedar
Point
Aneth
MONUMENT VALLEY
Mexican Hat
Glenn Canyon
City
LAKE POWELL
Navajo Mountain
Monument Valley Mission
6
6
6
4
4
3
3
4
4
3
3

Source: Rykaczewski, 1981.

FIGURE PP-6

Normal Precipitation, May through September

TABLE PP-6

Monthly and Annual Means and Extremes of Precipitation (inches)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL ·	PERIOD OF RECORD
ANETH PLANT 4650'	Ext Max	1.73	1.10	1.74	0.37	1.06	0.35	1.40	1.43	4.37	3.24	1.72	1.73		1965 - 1970
	Mean Avg	0.68	0.46	0.52	0.23	0.41	0.18	0.96	1.07	1.28	0.98	0.90	0.86	8.5	1965 - 1970
	Ext Min	0.04	0.00	0.00	0.06	0.00	0.00	0.48	0.40	0.10	0.00	0.30	0.18		1965 - 1970
BLANDING 6026'	Ext Max	4.07	2.50	3.20	3.08	2.24	2.84	3.09	4.95	3.79	3.84	2.17	3.89		1931 - 1970
	Mean Avg	1.3	1.2	1.1	0.9	0.7	0.5	1.1	1.5	1.2	1.2	1.0	1.5	13.2	1906 - 1970
	Ext Min	T	0.00	T	T	0.05	0.00	0.03	0.09	0.00	0.00	0.00	T		1931 - 1970
BLUFF 4320'	Ext Max	3.05	1.73	3.03	2.10	1.42	1.28	3.96	3.82	3.22	3.02	1.85	2.84		1931 - 1970
	Mean Avg	0.6	0.9	0.6	0.5	0.4	0.3	0.7	0.8	0.8	0.8	0.5	0.8	7.7	1916 - 1970
	Ext Min	0.06	0.08	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05	0.09		1931 - 1970
CANYONLANDS-THE NECK 5900'	Ext Max	0.91	1.09	0.89	0.98	1.40	2.38	2.21	2.12	1.62	1.53	1.74	1.78		1965 - 1970
	Mean Avg	0.3	0.4	0.5	0.7	0.8	0.9	1.3	1.1	0.8	0.8	0.7	0.9	9.2	1965 - 1970
	Ext Min	T	T	0.20	T	0.10	0.00	0.45	0.48	0.14	0.20	0.29	0.19		1965 - 1970
CANYONLANDS-THE NEEDLE 5040'	Ext Max	1.30	0.90	1.17	1.34	1.55	2.03	1.70	3.03	1.53	1.41	1.31	1.59		1965 - 1970
	Mean Avg	0.4	0.4	0.4	0.7	0.5	0.9	0.9	0.4	1.0	0.9	0.8	0.7	8.0	1965 - 1970
	Ext Min	0.01	0.21	0.02	T	T	0.03	0.13	0.40	0.20	0.10	0.47	T		1965 - 1970
CEDAR POINT 6780'	Ext Max	6.33	2.40	1.93	3.01	3.33	1.77	2.61	4.56	5.72	4.39	2.99	3.57		1946 - 1970
	Mean Avg	1.2	0.9	0.9	1.6	0.8	0.5	1.1	1.9	0.2	1.6	1.1	1.3	13.1	1946 - 1970
	Ext Min	0.07	0.00	T	0.00	0.04	0.00	0.17	0.23	T	0.00	0.03	0.01		1946 - 1970
HOVENWEEP NAT MON 5000'	Ext Max	2.17	2.14	1.87	2.38	1.91	0.77	1.89	3.00	3.71	2.19	2.04	2.64		1957 - 1970
	Mean Avg	0.6	0.8	0.8	0.8	0.6	0.4	0.7	1.3	1.0	1.2	0.9	1.7	9.8	1957 - 1970
	Ext Min	0.14	T	T	0.01	0.03	0.04	0.07	0.08	0.00	0.00	0.12	0.00		1957 - 1970
MEXICAN HAT 4270'	Ext Max	1.50	1.28	0.79	1.09	1.68	1.36	2.33	3.74	1.86	1.95	1.20	1.53		1946 - 1952
	Mean Avg	0.4	0.4	0.3	0.3	0.3	0.3	0.7	0.9	0.5	0.7	0.5	0.5	5.8	1946 - 1970
	Ext Min	0.00	T	0.00	0.03	0.00	0.00	0.9	0.2	0.00	0.00	0.00	0.00		1946 - 1952
MONTICELLO 7066'	Ext Max	5.60	1.75	2.97	2.65	3.01	2.14	3.62	3.84	6.18	3.74	2.50	3.16		1944 - 1970
	Mean Avg	1.1	1.1	1.2	1.0	0.8	0.6	1.7	2.0	1.5	1.8	1.0	1.2	15.0	1918 - 1970
	Ext Min	0.10	0.04	.06	0.00	0.09	0.00	0.27	0.11	0.17	0.00	0.02	T		1944 - 1970
MONUMENT VALLEY MISSION 5220'	Ext Max	0.77	1.40	1.26	0.75	0.53	1.15	2.19	1.70	2.19	2.54	1.03	2.32		1961 - 1970
	Mean Avg	0.3	0.7	0.4	0.4	0.2	0.3	0.9	0.9	0.8	0.8	0.4	0.8	6.9	1961 - 1970
	Ext Min	0.05	T	0.00	0.03	T	0.00	0.04	0.13	0.04	0.00	T	0.00		1961 - 1970
NATURAL BRIDGES NATL MOUN 6500'	Ext Max	2.70	3.63	1.97	1.55	1.17	1.33	4.33	2.95	2.47	2.14	1.99	4.31		1965 - 1970
	Mean Avg	0.8	1.3	0.9	0.7	0.6	0.8	2.4	2.0	0.9	0.9	1.1	1.8	14.2	1965 - 1970
	Ext Min	0.03	T	0.02	0.09	0.02	0.07	0.52	0.24	0.05	0.06	0.47	0.85		1965 - 1970
NAVAJO MOUNTAIN 6020'	Ext Max	2.34	4.21	3.35	1.94	1.52	1.11	0.90	3.42	2.60	5.29	3.90	2.97		1957 - 1970
	Mean Avg	1.0	1.2	0.9	0.5	0.4	0.3	0.3	0.8	0.9	1.4	1.1	1.1	9.9	1957 - 1970
	Ext Min	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00		1957 - 1970
GLEN CANYON CITY 4160'	Ext Max	1.27	1.45	0.72	1.66	1.42	0.30	1.49	1.89	1.04	0.99	1.34	1.37		1962 - 1970
	Mean Avg	0.4	0.5	0.4	0.4	0.4	0.1	0.7	1.0	0.5	0.3	0.6	0.6	5.9	1962 - 1970
	Ext Min	0.09	0.00	0.00	0.04	0.00	0.00	0.00	0.27	0.09	0.00	0.07	0.00		1962 - 1970
LOA * 7045'	Ext Max	1.48	0.92	1.78	2.17	1.58	2.07	2.83	4.09	3.55	4.37	1.22	1.41		1931 - 1970
	Mean Avg	0.4	0.4	0.5	0.5	0.5	0.4	1.10	1.3	0.8	0.6	0.4	0.4	7.3	1903 - 1970
	Ext Min	0.01	0.00	0.01	T	0.00	0.00	0.20	0.14	0.00	0.00	0.00	0.01		1931 - 1970
MOAB 4 NW* 3970'	Ext Max	1.40	1.37	1.17	1.81	1.93	2.06	2.29	2.23	2.43	3.04	1.87	2.13		1951 - 1970
	Mean Avg	0.7	0.6	0.8	0.7	0.7	0.4	0.7	0.8	0.9	1.0	0.6	0.8	0.7	1890 - 1970
	Ext Min	0.07	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00		1951 - 1970

NOTE: T = Trace = less than 0.01 inch. Glen Canyon City, Loa, and Moab are representative of the SJRA.

Source: Rykaczewski, 1981.

The unpredictable occurrence and distribution of moisture in the resource area creates a feast-or-famine situation for farmers, livestock operators, and wildlife (Edwards, 1978). Data indicate a drying or drier trend compared to periods prior to modern settlement. For example, the 30-year normals (1931 through 1960) are only 90 percent of the 2,000-year average (Brough, et al., 1983). The current 30-year normals for precipitation (including record amounts in 1982-83) are about 95 percent of the 2,000-year average (Brough, et al., 1983).

Moisture sets the limits on agricultural use and is a key element in many land use decisions. The available moisture (7 to 10 inches yearly on the average) is insufficient for crop production without irrigating or using surface water. Production on nonirrigated land is increased through moisture saving practices. Summer fallowing allows production of small grains and beans, with moisture saving rest one year and cropping the next.

Irrigation, utilizing snow-fed streams and reservoirs, allows relatively concentrated agriculture near streams rising in the Abajo Mountains and along the San Juan River near Bluff. Elevation constrains the growing season and limits crop selection near Monticello and Bluff, while lack of surface water and limited precipitation necessitates dryland cropping in an area from Monticello east to the state line. Topography further limits agricultural cropping, so that most of the resource area is grazing land with use potential determined by season.

These adaptive practices have allowed maximum expansion of private ownership. Land not taken up or converted to crop production has been utilized for grazing so that public domain has made (and still makes) its contribution to agriculture.

Forage utilization on public land requires careful management (cross-reference: Grazing Management, Part II). Forage amount and availability is not solely a matter of frost- or freeze-free periods. Grass growth responds to daylight hours and available moisture as significantly as to warmth. Use periods must be keyed to both emergence and development, and these tie to sunlight and weather patterns. In some areas, such as Beef Basin in the northwest quadrant of the resource area, forage availability exceeds stock water. This led to construction in 1983 of a water catchment and storage facility that cost $92,763 (cross-reference: Water, Part I, and Soil, Water, and Air, Part II). This device will catch and hold storm water and allow use of the area at a desirable season. Historically, use was restricted to times when surface snow could provide stock water. This made management difficult because snow closed normal access to the area.

In other areas, water has been piped long distances to allow harvest of available forage. For example, the Tank Bench Well north of Bluff now has 6.5 miles of pipeline so as to spread use over the maximum area. Use does tie to moisture. Management must balance investment against return as both BLM and stockmen seek to maximize use return.

The major land use demands of the area are mineral extraction, grazing, and recreation (including wildlife harvest)(cross-reference: Oil and Gas Leasing; Mineral Material; Mining Law Administration; Grazing Management; Recreation Management; and Wildlife Habitat Management, Part II). Domestic animals and wildlife compete for water sources, as well as for forage. Mineral developments, drill pads, spoil piles, roads, and transport and utility corridors disturb land slow to heal or revegetate (cross-reference: Access, Part I and Energy/Non-Energy Realty, Part II). Yet use is possible: the land can yield desired resources if climate is considered, and if values are weighed against costs, disturbance against rehabilitation, and benefits against detriments.

Use must relate not only to averages but to cycles and climate trends. One year's drought is not offset by a small gain in moisture the following year. Damage comes easily; recovery is slow and unpredictable.

Management cannot forecast the snowpack in Colorado, which is the predominant source of recreation (river-running) water in the San Juan River. None can say with confidence when a disturbed area will have sufficient moisture for revegetation and long-term rehabilitation. None can predict the long-term consequence of a new mineral find or new oil or natural gas basin, because impacts can accumulate as much from anticipation as from development. It is known that discovery and development create impact; management must then proceed with approvals and use stipulations with the caution learned in dry cycles as well as in more generous water years.

Water is a critical element in decision making. It can also be a damaging element when a flash flood roars down a dry arroyo after a summer thunderstorm. The climatalogical data and the land itself are both reminders that unwise land use compounds as nature exacts a toll from denuded or exposed surfaces. All decisions should be conditioned by climate when moisture is as critical and variable as it is in the SJRA.

TOPOGRAPHY

LIST OF OVERLAYS

None; topography is shown on the resource area base map.

RESOURCE OVERVIEW

The SJRA lies entirely within the Colorado Plateau physical province of the U.S. (figure PP-7). Major landforms of the region are shown in figure PP-8.

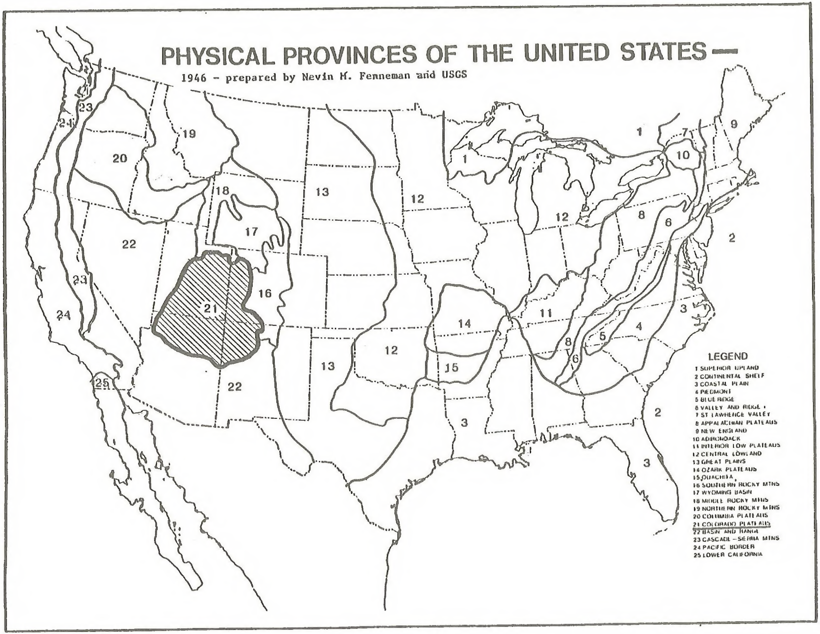
The SJRA is made up principally of nearly level erosional plains that have been intricately dissected by drainages. The plains form an extensive pinyon-juniper forest that appears from a distance to be interrupted by no more than a gradual change in topographic expression. Upon closer inspection, the expanse of plain is regularly interrupted by narrow, sinuous canyons that range from a few to several hundred feet deep (USGS topographic maps). Table PP-7 shows the elevations of several topographic points in the SJRA.

Field observations over the resource area show that the canyon rims are generally characterized by a thick, resistant sandstone layer which forms a nearly vertical ledge up to 300 feet thick. Below these ledges the canyon may remain narrow and constricted with very steep walls in solid, resistant rock, or may open out with walls sloped gently enough to allow an accumulation of landslide deposits or the development of soils on softer layers exposed within the walls.

In the central portion of the resource area the topography is dominated by the Abajo Mountains and the erosional pediments that drape the flanks of the mountains. The Abajos are a small laccolithic range with an average elevation of 10,000 feet above sea level, and they provide a landmark visible from nearly all points within the resource area. The Abajos fall within the Manti-LaSal National Forest, managed by the USFS.

South of the Abajos, Comb Ridge marks the eastern edge of the Monument Upwarp. Comb Ridge is a prominent landform of upended, jagged sandstone blocks. The Monument Upwarp is cut by deep canyons that run to the San Juan River or to the Colorado River (cross-reference: Water, Part I).

The topography of the resource area both benefits and deters resource management. A large part of the recreational draw to San Juan County is associated with the scenery, a spectacular topographic and geologic display. On the other hand, the topography of the area restricts cross-country travel and makes point-to-point transportation an arduous task (cross-reference: Access, Part I). Few high-speed roads have been constructed because of a combination of sparse population and the difficulty of the terrain. Restricted access off the main roadways makes mineral exploration and rangeland management more costly and time consuming. Topography has a direct effect on watershed management, because steep terrain causes a faster runoff of a greater volume of water than gently sloping terrain, and there is a great deal of steep terrain in this resource area.


PHYSICAL PROVINCES OF THE UNITED STATES —
1946 - prepared by Nevin M. Fenneman and USGS
24
23
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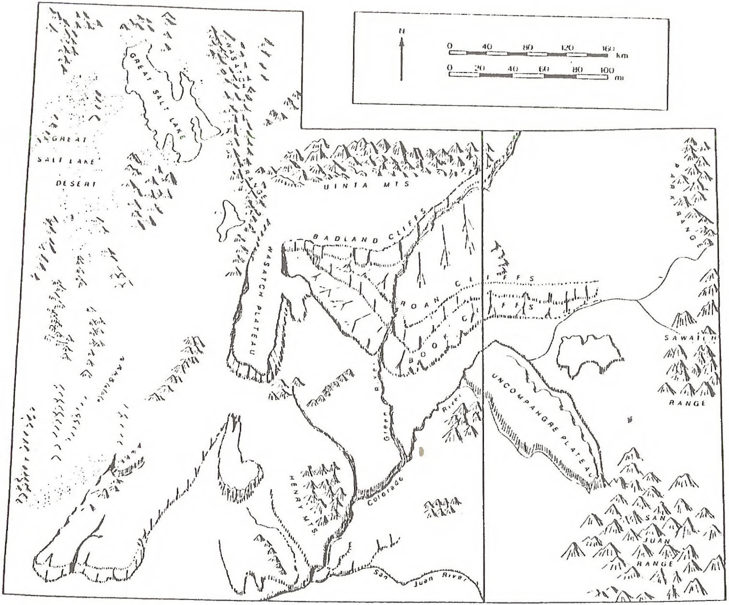
2
3
LEGEND
1 SUPERIOR UPLAND
2 CONTINENTAL SHELF
3 COASTAL PLAIN
4 PIEDMONT
5 BLUE RIDGE
6 VALLEY AND RIDGE
7 ST LAWRENCE VALLEY
8 APPALACHIAN PLATEAUS
9 NEW ENGLAND
10 ADIRONDACK
11 INTERIOR LOW PLATEAUS
12 CENTRAL LOWLAND
13 GREAT PLAINS
14 OZARK PLATEAUS
15 OUACHITA
16 SOUTHERN ROCKY MTNS
17 WYOMING BASIN
18 MIDDLE ROCKY MTNS
19 NORTHERN ROCKY MTNS
20 COLUMBIA PLATEAUS
21 COLORADO PLATEAUS
22 BASIN AND RANGE
23 CASCADE – SIERRA MTNS
24 PACIFIC BORDER
25 LOWER CALIFORNIA

FIGURE PP-7

Physical Provinces of the United States


N
0 40 80 120 160 km
0 20 40 60 80 100 mi
GREAT SALT LAKE
WASATCH RANGE
GREAT SALT LAKE DESERT
UINTA MTS
BADLAND CLIFFS
ROAN CLIFFS
BOOK CLIFFS
WASATCH PLATEAU
PARK RANGE
SAWATCH RANGE
UNCOMPAHGRE PLATEAU
Green River
River
Colorado
HENRY MTS
SAN JUAN RANGE
San Juan River

Source: Aerocomp, 1984.

FIGURE PP-8

Landform Features

TABLE PP-7

Elevations of Selected Topographic Points and Cultural Features
(feet above sea level)

Location	Average Elevation
Abajo Peak[a]	11,300
Aneth	4,500
Blanding	6,100
Bluff	4,300
Cedar Mesa	6,600
Clay Hills Crossing	3,800
Dugout Ranch	5,300
Eastland	6,800
Halls Crossing	4,000
Harts Point	6,500
Hovenweep	5,200
Lake Powell[b]	3,700
LaSal	7,000
Lisbon Valley	6,600
Mexican Hat	4,200
Montezuma Creek	4,400
Monticello	7,000
Monument Valley	4,800
Tables of the Sun	7,400
Three Step Hill	7,200
White Canyon	5,400

[a] Highest point in SJRA.

[b] Lowest point in SJRA.

Source: USGS Topographic Maps.

GEOLOGY

LIST OF OVERLAYS

None

RESOURCE OVERVIEW

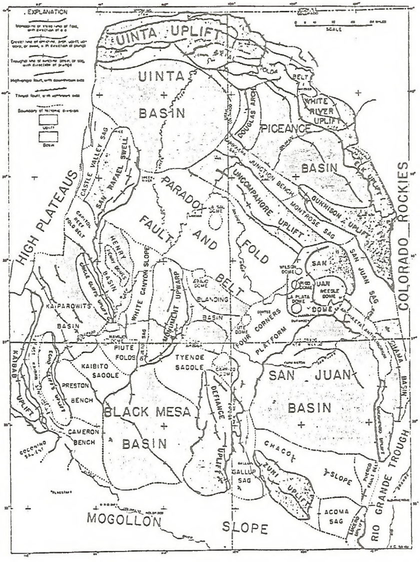
The SJRA rests upon the Colorado Plateau, a structural high geologic feature on the North American continent. The Colorado Plateau occupies the Four Corners region: northwest New Mexico, northeast Arizona, eastern Utah, and western Colorado. It is characterized by its own system of folding, faults, uplifts, and basins (see figure PP-9) (cross-reference: Topography, Part I).

The lowermost rocks exposed in the resource area are Middle Pennsylvanian in age (Lewis, 1965), and the historical record of earlier times must be inferred from wells drilled deep enough to sample these strata. Sample stratigraphic columns are shown in figure PP-10. The record through the Cambrian period indicates layers of water-laid sediments, limestone, dolomite, shale, and arkosic conglomerate. Strata from the Ordovician, Silurian, and most of the Devonian are absent from the stratigraphic record, and are thought to indicate a period of non-deposition rather than erosion. From Late Devonian to Middle Pennsylvanian the region accumulated fine clastic and chemical sediments.

Middle Pennsylvanian rocks exposed are members of the Hermosa Group: the Paradox and Honaker Trail Formations. Both formations were deposited in a shallow sea environment and are made up of limestone, dolomite, shale, salt, and sandstone layers. Pennsylvanian strata are exposed only in the deeper canyons of the resource area, such as Dark Canyon, Gypsum Canyon, and the canyons of the Colorado and San Juan Rivers.

During the Permian age, the Pennsylvanian shallow sea was squeezed from the east by continental sediments eroding off of the Uncompahgre uplift in the area that is now western Colorado. Thus Permian deposits are represented by limestone, shale, and near-shore sandstone on the west and arkosic sands and shales on the east of the resource area. All of these Permian strata have been formed into the Cutler Group, represented by the Elephant Canyon Formation, the Halgaito Formation, the Cedar Mesa Sandstone, and the Organ Rock Shale in ascending order on the west, and by undifferentiated, mostly shale layers on the east. Cutler deposits are now exposed on the Monument Upwarp at Mexican Hat, on Cedar Mesa, and in Beef Basin.

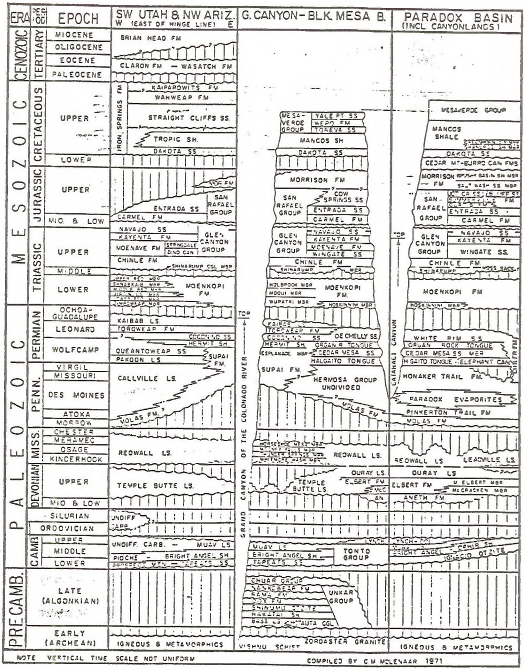
By the beginning of Triassic time, the shallow sea of the Pennsylvanian era had been completely filled by sediment. The Moenkopi Formation was deposited as a near shore and tidal lagoon sediments (Lewis, 1965), and following the Moenkopi was the Chinle Formation (mostly fresh water sandstones and shales) and the Glen Canyon Group (O'Sullivan, 1975). The Wingate Sandstone, the Kayenta Formation, and the Navajo Sandstone make up the Glen Canyon Group. The Wingate and the Navajo were aeolian sands, while the Kayenta Formation was fluviatile, and all three strata were continental in origin. All of the Triassic age strata are exposed within the western half of the resource area.


EXPLANATION
Monocline or steep limb of fold, with direction of dip
Crestal line of anticline, arch, uplift, upwarp, or dome, with direction of plunge
Troughal line of syncline, basin, or sag, with direction of plunge
High-angle fault, with downthrown side
Thrust fault, with upthrown side
Boundary of tectonic division
Uplift
Basin
SCALE
UINTA UPLIFT
UINTA BASIN
DOUGLAS ARCH
PICEANCE BASIN
WHITE RIVER UPLIFT
COLORADO ROCKIES
HIGH PLATEAUS
CASTLE VALLEY SAG
SAN RAFAEL SWELL
CAPITOL REEF FOLD BELT
PARADOX FAULT AND FOLD BELT
JUNCTION BENCH
UNCOMPAHGRE UPLIFT
MONTROSE SAG
GUNNISON UPLIFT
HENRY BASIN
CIRCLE CLIFFS UPLIFT
WHITE CANYON SLOPE
MONUMENT UPWARP
ABAJO DOME
BLANDING BASIN
SAN JUAN DOME
SAN JUAN SAG
WILSON DOME
RICO DOME
LA PLATA DOME
NEEDLE DOME
FOUR CORNERS PLATFORM
UTE DOME
KAIPAROWITS BASIN
PIUTE FOLDS
KAIBAB UPLIFT
KAIBITO SADDLE
PRESTON BENCH
TYENDE SADDLE
SAN JUAN BASIN
CHAMA BASIN
BLACK MESA BASIN
DEFIANCE UPLIFT
CAMERON BENCH
GALLUP SAG
ZUNI UPLIFT
CHACO SLOPE
NACIMIENTO UPLIFT
ACOMA SAG
LUCERO UPLIFT
RIO GRANDE TROUGH
MOGOLLON SLOPE

Source: Four Corners Geological Society, 1975.

FIGURE PP- 9

Tectonic Divisions of the Colorado Plateau


ERA
PERIOD
EPOCH
SW UTAH & NW ARIZ.
W (EAST OF HINGE LINE) E
G. CANYON-BLK. MESA B.
PARADOX BASIN
(INCL. CANYONLANDS)
CENOZOIC
TERTIARY
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
MESOZOIC
CRETACEOUS
UPPER
LOWER
JURASSIC
UPPER
MID. & LOW
TRIASSIC
UPPER
MIDDLE
LOWER
PALEOZOIC
PERMIAN
OCHOA-GUADALUPE
LEONARD
WOLFCAMP
PENN.
VIRGIL
MISSOURI
DES MOINES
ATOKA
MORROW
MISS.
CHESTER
MERAMEC
OSAGE
KINDERHOOK
DEVONIAN
UPPER
MID. & LOW
SILURIAN
ORDOVICIAN
CAMB.
UPPER
MIDDLE
LOWER
PRECAMB.
LATE (ALGONKIAN)
EARLY (ARCHEAN)
BRIAN HEAD FM
CLARON FM — WASATCH FM
IRON SPRINGS FM
KAIPAROWITS FM
WAHWEAP FM
STRAIGHT CLIFFS SS.
TROPIC SH.
DAKOTA SS
SAN RAFAEL GROUP
ENTRADA SS
CARMEL FM
NAVAJO SS
KAYENTA FM
MOENAVE FM
SPRINGDALE
DINO CAN
GLEN CANYON GROUP
CHINLE FM
SHINARUMP CGL MBR
MOENKOPI FM
KAIBAB LS
TOROWEAP FM
COCONINO SS
HERMIT SH
QUEANTOWEAP SS
PAKOON LS
SUPAI FM
CALLVILLE LS
MOLAS FM
REDWALL LS
TEMPLE BUTTE LS
UNDIFF CARB.
MUAV LS
PIOCHE
BRIGHT ANGEL SH
PROSPECT MTN
TAPEATS SS
IGNEOUS & METAMORPHICS
MESA-VERDE GROUP
YALE PT SS
WEPO FM
TOREVA SS
MANCOS SH
DAKOTA SS
MORRISON FM
COW SPRINGS SS
SAN RAFAEL GROUP
ENTRADA SS
CARMEL FM
GLEN CANYON GROUP
NAVAJO SS
KAYENTA FM
MOENAVE FM
WINGATE SS
CHINLE FM
SHINARUMP
MBR
HOLBROOK MBR
MOQUI MBR
WUPATKI MBR
MOENKOPI FM
HOSKINNINI MBR
KAIBAB LS
TOROWEAP FM
COCONINO SS
DE CHELLY SS
HERMIT SH
ORGAN R. TONGUE
ESPLANADE MBR
CEDAR MESA SS
HALGAITO TONGUE
SUPAI FM
HERMOSA GROUP UNDIVIDED
MOLAS FM
TOP
GRAND CANYON OF THE COLORADO RIVER
HORSESHOE MESA MBR
MOONEY FALLS MBR
THUNDER SPRINGS MBR
WHITMORE WASH MBR
REDWALL LS.
OURAY LS.
ELBERT FM
MCC
AN
TEMPLE BUTTE LS.
MUAV LS
BRIGHT ANGEL SH
TAPEATS SS
TONTO GROUP
LYNCH
CHUAR GROUP
NANKOWEAP FM
DOX FM
SHINUMO QTZITE
HAKATAI SH
BASS LS
HOTAUTA CGL
UNKAR GROUP
VISHNU SCHIST
ZOROASTER GRANITE
CATARACT CANYON
MESAVERDE GROUP
MANCOS SHALE
DAKOTA SS
CEDAR MT-BURRO CAN FMS
MORRISON FM
BRUSHY BASIN SH MBR
SALT WASH SS MBR
SAN RAFAEL GROUP
ENTRADA SS
CARMEL FM
GLEN CANYON GROUP
NAVAJO SS
KAYENTA FM
WINGATE SS
CHINLE FM
SHINARUMP
MOSS BACK
MOENKOPI FM
HOSKINNINI MBR
WHITE RIM SS
ORGAN ROCK TONGUE
CEDAR MESA SS MBR
HALGAITO TONGUE
ELEPHANT CANYON
CUTLER FM
HONAKER TRAIL FM
PARADOX EVAPORITES
PINKERTON TRAIL FM
MOLAS FM
REDWALL LS
LEADVILLE LS
OURAY LS
ELBERT FM
U. ELBERT MBR
McCRACKEN MBR
ANETH FM
LYNCH-DOL
OPHIR SH
BRIGHT ANGEL
IGNACIO QTZITE
IGNEOUS & METAMORPHICS
NOTE VERTICAL TIME SCALE NOT UNIFORM
COMPILED BY C.M. MOLENAAR 1971

Source: Four Corners Geological Society, 1975.

FIGURE PP- 10

Nomenclature Chart of the Canyonlands and Adjacent Areas

During the Early Jurassic age the western U.S. was once again inundated by a shallow sea, with the western edge of the continent lying at approximately east central Utah (Craig, 1975). The San Rafael Group was deposited during this time. Within the resource area only the Entrada Sandstone, the Summerville Formation, and the Bluff Sandstone of the San Rafael Group were deposited. They represent shore and near-shore sandstone and mudstone deposits from the edge of the western shallow sea, while in western Utah the marine Carmel and Curtis Formations were deposited within the sea during the same time period.

In the Late Jurassic there was an uplift of the land in the region of California, southern Nevada and western Arizona, and this resulted in an outward spreading of erosional sediments that contributed to the makeup of the Morrison Formation (Craig, 1975). The Morrison is divided into four members, all of which occur in some part of the SJRA. Exposures of the Morrison are found in the eastern half of the resource area, generally as a slope-former in canyons such as East Canyon and Montezuma Canyon.

Cretaceous sediments are the youngest found in the SJRA. They are the Dakota/Burro Canyon Formation and the Mancos Shale. The Dakota and Burro Canyon are very similar in lithology (mostly sandstone and conglomerates) and in places are nearly indistinguishable. Their environment of deposition was on a coastal plain adjacent to a re-advancing sea (Molenaar, 1981) where sediments were being washed in from the area that is now New Mexico. The Dakota/Burro Canyon is found on the surface of the eastern portion of the SJRA as cap rock over Morrison canyon walls and the tops of many pinyon-juniper mesas.

The Mancos Shale is Late Cretaceous in age, and the few remnants of this formation left within the resource area are east of Monticello or on the flanks of the Abajo Mountains. It was a fairly uniform layer of dark gray shale up to 2,500 feet thick that was deposited in an inland sea that covered the entire resource area, as well as large parts of Colorado, New Mexico, and Wyoming.

Geologic factors are related to the management of nearly every other resource managed in this area, either directly or indirectly. Naturally, geology plays an integral role in minerals management within the SJRA, but geology is also directly related to the types of soils that form and the types of vegetation that grow on the soils. It would be difficult to single out just a few formations that contribute to recreational value in the resource area. The geology and resulting topography provide the scenic quality of the resource area, and many individual formations have their own special appeal:

-Morrison Formation - paleontology, particularly dinosaurs.
-Entrada Sandstone - arch-former;
-Wingate Sandstone - buttes and cliffs near Red Canyon and Indian Creek;
-Chinle Formation - petrified wood;
-Cedar Mesa Sandstone - natural bridges and pouroffs; and
-Cutler Formation - pinnacles and buttes in Beef Basin;

The Navajo Sandstone is the principal aquifer in the SJRA, but the Morrison Formation, Dakota Sandstone, Cedar Mesa Sandstone and others provide limited amounts of water in springs that are used by wildlife, livestock, and recreationists.

The Cedar Mesa Sandstone and the Entrada Sandstone are alcove-formers within the SJRA, but no limestone caves are known in the area, and no management plans have been formulated for caves (see IM 84-541, Cave Management Policy).

SOILS

LIST OF OVERLAYS

General Soil and Vegetation Groups.

RESOURCE OVERVIEW

Soils in the SJRA are described in the Soil Survey of the Canyonlands Area and in the Soil Survey of San Juan County, Central Part. These surveys are in draft manuscript and are available in the SJRA office.

These soil survey manuscripts are divided into two major parts. The first part is the general soil map and general soil map unit descriptions. These serve as the basis for the planning map. The map units consist of three major soil types or miscellaneous areas, such as rock outcrop, occurring in that part of the resource area. The delineations on this general soil map were based on the detailed soil maps and reflect vegetation communities and climate patterns, as well as soil types.

The second part of the soil survey manuscript is composed of detailed soil map unit descriptions and soil descriptions. This part of the manuscript describes the soils and map units available on the 1:24,000 scale orthophotoquads.

The general soil map of the SJRA can be broken into four major climatic groups as shown in table PP-8 (cross-reference: Climate, Part I).

A more complete description of each general soil map unit is in the appendix. The legend for these map units is given in table PP-9. Symbols 1 to 11 are from the Soil Survey of San Juan County, Central Part. Symbols 101 to 111 are from the Soil Survey of the Canyonlands Area.

The general soil map can be used as an areawide planning guide for estimating (1) potential erosion rates; (2) rehabilitation potential for disturbed areas; and (3) success in vegetation manipulation. Table PP-10 gives estimated water and wind erosion rates for the general soil map units. Sizes of the detailed soil map units are shown in table PP-11. Table PP-12 lists the map units that meet the criteria for prime farmland or land important to the state.

TABLE PP-8

General Soil Map Units for Broad Land Use Planning

Description	Map Units in Group	Percent of SJRA	Vegetation	Elevation (feet)	Average Annual Precipitation (inches)	Mean Annual Air Temperature (°F)	Average Annual Freeze-Free Season (days)	Uses
Dominantly well drained, somewhat excessively drained, nearly level to moderately steep soils on low benches, terraces, cuestas, and valleys in arid climate zone. Very shallow to very deep; formed in residuum and aeolian deposits derived dominantly from sandstone, shale, and limestone.	6	34	shrubs grasses	3,700 to 5,600	6 - 8	52 - 56	150 - 220	rangeland wildlife habitat irrigated cropland recreation
Dominantly well drained to excessively drained, gently sloping to extremely steep soils on benches, cuestas, mesas, escarpments, and canyon walls in semiarid climate zone. Very shallow to very deep; formed in colluvium, residuum, and aeolian deposits derived dominantly from sandstone and shale.	8	36	shrubs grasses	4,500 to 6,000	8 - 12	49 - 54	120 - 160	rangeland wildlife habitat woodland recreation
Dominantly well drained, nearly level to very steep soils on upland benches, fans, cuestas, hillslopes, and escarpments in dry subhumid climate zone. Very shallow to very deep; formed in aeolian deposits, alluvium, colluvium, and residuum derived dominantly from sandstone and shale.	6	29	shrubs grasses pinyon Utah juniper	5,500 to 7,500	12 - 16	45 - 52	100 - 150	rangeland woodland wildlife habitat recreation (small areas for irrigated cropland)
Dominantly well drained, gently sloping to very steep soils on high benches, fans, landslides, and escarpments in moist subhumid and humid climate zones. Shallow to very deep; formed in aeolian deposits, alluvium, colluvium, and residuum derived dominantly from igneous and sedimentary rocks.	2	1	Gambel oak ponderosa pine pinyon shrubs grasses	7,500 to 8,900	16 - 25	40 - 45	50 - 100	rangeland wildlife habitat woodland recreation

TABLE PP-9

Legend of General Soil Map Units

General Soil Map Unit Symbol	Soil Map Unit Name
1	Rock Outcrop - Piute - Sheppard
2	Moenkopie - Rock Outcrop - Myton
3	Limeridge - Nakai - Bluechief
4	Skos - Rock Outcrop - Mido
5	Skos - Myton family - Milok
6	Rizno - Littlenan - Bodot
7	Ruinpoint - Rizno - Cahona
8	Barx - Rizno - Yarts
9	Cahona - Rizno - Strych
10	Rizno - Strych - Rock Outcrop
11	Bookcliff - Strych - Skos
101	Rock Outcrop - Moenkopie
102	Moenkopie - Rock Outcrop - Hoskinnini
103	Sheppard - Thoroughfare - Monue
104	Ustic Torriorthents - Lithic Torriorthents
105	Rock Outcrop - Rizno - Mido
106	Begay - Windwhistle - Redbank
107	Rizno - Rock Outcrop, dry
108	Palma - Cahona - Hagerman
109	Rizno - Rock Outcrop
110	Ustic Torriorthents - Ustollic Calciorthids - Ustollic Haplargids

TABLE PP-10

Estimated Water and Wind Erosion Rates for Soils in the General Soil Map Units (tons per acre per year)

Map Unit		Water Erosion Rates		Wind Erosion Rates	
		At Present	After Surface Disturbance	At Present	After Surface Disturbance
1	Rock Outcrop	---	---	---	---
	Piute	0.5	2.0	1.0	20+
	Sheppard	0.1	0.5	1.0	20+
2	Moenkopie	0.05	0.5	0.05	1.0
	Rock Outcrop	---	---	---	---
	Myton family	0.1	2.0	0.05	0.15
3	Limeridge	0.1	2.0	0.5	5
	Nakai	0.1	1.0	1.0	20+
	Bluechief	0.1	1.0	1.0	20+
4	Skos	0.05	0.5	0.05	0.05
	Rock Outdrop	---	---	---	---
	Mido	0.1	0.5	1.0	20+
5	Skos	0.05	0.5	0.05	0.05
	Myton family	0.1	2.0	0.05	0.05
	Milok	0.1	1.0	1.0	20+
6	Rizno	0.1	1.0	0.1	5.0
	Littlenan	0.1	10	0.05	0.1
	Bodot	0.5	15	0.05	0.1
7	Ruinpoint	0.1	2.0	0.1	20
	Rizno	0.1	1.0	0.1	5
	Cahona	0.1	2.0	0.1	10
8	Barx	0.1	2.0	0.1	10
	Rizno	0.1	5.0	0.1	5
	Anasazi	0.5	5.0	0.1	10
9	Cahona	0.1	2.0	0.1	10
	Rizno	0.1	5.0	0.1	5
	Strych	0.1	10	0.05	0.05
10	Rizno	0.1	5.0	0.1	5
	Strych	0.1	10	0.05	0.05
	Rock Outcrop	---	---	---	---
11	Bookcliff	0.01	1.0	0.1	1.0
	Strych	0.1	10	0.05	0.1
	Skos	0.1	10	0.05	0.1
101	Rock Outcrop	---	---	---	---
	Moenkopie	0.05	0.5	0.05	1.0
102	Moenkopie	0.05	0.5	0.05	1.0
	Rock Outcrop	---	---	---	---
	Hoskinnini	0.05	0.5	0.05	1.0
103	Sheppard	0.1	0.5	1.0	20+
	Thoroughfare	0.1	0.5	0.5	
	Monue	0.1	0.5	1.0	20+

TABLE PP-10 (Concluded)

Map Unit		Water Erosion Rates		Wind Erosion Rates	
		At Present	After Surface Disturbance	At Present	After Surface Disturbance
104	Ustic Torriorthents	0.1	10	0.05	0.15
	Lithic Torriorthents	0.1	5	0.05	0.1
105	Rock Outcrop	---	---	---	---
	Rizno	0.1	1.0	0.1	5.0
	Mido	0.1	0.5	1.0	20+
106	Begay	0.1	1.5	0.1	20
	Windwhistle	0.1	1.5	0.1	20
	Redbank	0.1	1.0	0.1	10
107	Rizno	0.1	.0	0.1	5
	Rock Outcrop	---	---	---	---
108	Palma	0.1	2.0	0.1	5
	Cahona	0.1	2.0	0.1	10
	Hagerman	0.1	2.0	0.1	10
109	Rizno	0.1	5	0.1	5
	Rock Outcrop	---	---	---	---
110	Ustic Torriorthents	0.1	10	0.05	0.05
	Ustollic Calciorthids	0.5	15	0.05	0.1
	Ustollic Haplargids	0.1	15	0.05	0.1

TABLE PP-11

Acreage and Proportional Extent of Detailed Soil Map Units

Map Symbol	Name	Acres	Percent of Resource Area
FKC	Arches - Sheppard - Rock Outcrop Complex	3,682	0.1
BD	Badland	3,928	0.1
KBA	Barnum loam, 0 to 3 percent slopes	548	---
KAA	Barnum silty clay loam, 0 to 3 percent slopes	4,793	0.2
PbC	Barx fine sandy loam, 3 to 8 percent slopes	995	---
AAC	Begay fine sandy loam, 2 to 6 percent slopes	18,791	0.9
AACH	Begay fine sandy loam, moist, 2 to 6 percent slopes	7,857	0.4
AMD	Begay - Rizno Complex	12,795	0.6
AKF	Begay - Rock Outcrop - Mido Complex	9,524	0.5
GCC	Bluechief fine sandy loam, 1 to 8 percent slopes	376	---
RMD	Bond - Rizno fine sandy loams, 3 to 15 percent slopes	14,804	0.7
CNC	Bond - Windwhistle Complex	3,995	0.2
DbC	Cahona fine sandy loam, 2 to 8 percent slopes	1,807	
XAC	Cataract loamy fine sand, 2 to 8 percent slopes	1,815	0.1
TXD	Falcon - Bond - Rock Outcrop Complex	4,215	0.2
TXH	Falcon - Bond - Rock Outcrop Complex, very steep	1,320	0.1
CdC	Hagerman very fine sandy loam, 2 to 8 percent slopes	725	---
WrA	Hoskinnini very gravelly fine sandy loam, 0 to 8 percent slopes	1,103	0.1
QKCH	Ignacio - Leanto Complex	14,980	0.7
QKCL	Ignacio - Leanto, low rainfall, Complex	2,035	0.1
FACH	Mido loamy fine sand, 2 to 8 percent slopes	3,893	0.2
MAC	Mido loamy fine sand, dry, 2 to 8 percent slopes	14,081	0.6
EAC	Mivida fine sandy loam, 2 to 8 percent slopes	6,873	0.3

GEC	Moab gravelly fine sandy loam, 2 to 8 percent slopes	865	---
TbC	Moab very cobbly fine sandy loam, 3 to 30 percent slopes	2,823	0.1
SSD	Moenkopie - Rock Outcrop Complex	16,516	0.8
ACC	Nakai fine sand, 2 to 8 percent slopes	4,092	0.2
YAC	Nepalto gravelly sandy loam, 2 to 8 percent slopes	1,484	0.1
UAA	Newsrock loamy fine sand, 1 to 3 percent slopes	451	---
LAA	Redbank fine sandy loam, 0 to 3 percent slopes	7,259	0.3
LAC	Redbank fine sandy loam, 3 to 8 percent slopes	3,842	0.2
LbA	Redbank very fine sandy loam, 0 to 3 percent slopes	1,698	0.1
TSD	Rizno - Rock Outcrop Complex	36,916	1.8
TSDI	Rizno - Rock Outcrop Complex, low rainfall	13,209	0.6
RS	Rock Outcrop	40,461	1.9
SV	Rock Outcrop - Moenkopie Complex	26,055	1.2
RT	Rock Outcrop - Rizno Complex	55,724	2.7
RTI	Rock Outcrop - Rizno Complex, low rainfall	48,154	2.3
FSD	Rock Outcrop - Ustic Torripsamments	22	---
HPD	Shalako - Anasazi - Rock Outcrop Complex	443	---
FeC	Sheppard fine sand, 2 to 8 percent slopes	2,620	0.1
ZAC	Thoroughfare fine sandy loam, 2 to 8 percent slopes	6,363	0.3
MCC	Trail fine sand, 0 to 5 percent slopes	1,022	---
FL	Ustic Torrifluvents - Ustic Torrifluvents, sodic, Typic Ustifluvents Complex	3,036	0.1
TTH	Ustic Torriorthents - Lithic Torriorthents - Rock Outcrop	61,034	2.9
RWG	Ustic Torriorthents - Ustollic Calciorthids Complex	15,965	0.8
TWG	Ustic Torriorthents - Ustollic Haplargids	29,646	1.4
CAC	Windwhistle very fine sandy loam, 1 to 6 percent slopes	2,970	
CKA	Windwhistle - Sazi Complex	2,963	0.1

TABLE PP-11 (Continued)

Map Symbol	Name	Acres	Percent of Resource Area
1	Arches - Rizno - Mido Complex	10,116	0.5
2	Badland - Rock Outcrop Complex	14,460	0.7
3	Bankard family - Riverwash Complex	7,126	0.3
4	Bankard family - Sheppard Complex	3,642	0.2
5	Barx very fine sandy loam, 1 to 4 percent slopes	22,291	1.1
6	Barx - Strych - Skos Complex	8,795	0.5
7	Bluechief - Limeridge - Nakai Complex	48,674	2.3
8	Bodot - Strych - Skos Association	62,367	3.0
9	Bookcliff - Bookcliff, dry Complex	4,686	0.2
10	Bookcliff - Skos - Strych Complex	4,985	0.2
11	Cahona very fine sandy loam, 1 to 8 percent slopes	3,372	0.2
15	Green River - Bankard families - Riverwash Association	8,721	0.4
16	Kiln loam, 2 to 15 percent slopes	2,434	0.1
17	Limeridge gravelly very fine sandy loam, 4 to 12 percent slopes	14,184	0.7
18	Littlenan - Moenkopie - Recapture Complex	14,153	0.7
19	Littlenan - Ruinpoint - Rizno Association	28,722	1.4
20	Mido - Riverwash Complex	1,257	0.1
21	Mido - Rizno Complex	10,819	0.5
22	Mido - Rock Outcrop - Arches Complex	18,230	0.9
23	Milok fine sandy loam, 1 to 6 percent slopes	10,831	0.5
24	Milok - Mivida fine sandy loams	25,136	1.2
25	Milok - Skos - Strych Complex	3,258	0.2
26	Mivida fine sandy loam, 1 to 6 percent slopes	5,105	0.2
27	Mivida - Pasterm - Rock Outcrop Complex	16,671	0.9
28	Moenkopie - Moenkopie, warm Complex	52,348	2.6

29	Moenkopie - Rock Outcrop Complex	64,760	3.1
32	Myton family - Nakai - Redhouse Complex	34,707	1.6
33	Myton family - Rock Outcrop Complex	13,060	0.6
34	Myton family - Shulet - Badland Complex	17,981	0.9
35	Myton family - Skos - Rock Outcrop Association	85,042	4.1
36	Nakai fine sandy loam, 1 to 6 percent slopes	7,329	0.4
37	Nakai - Moffat - Sheppard Association	16,324	0.9
39	Pastern - Riano - Rock Outcrop Complex	12,958	0.6
40	Piute - Sheppard - Rock Outcrop Association	48,170	2.3
42	Recapture - Redbank family - Bankard family Association	2,169	0.1
43	Redbank family - Riverwash - Green River family Association	6,724	0.3
44	Redhouse fine sandy loam, 2 to 8 percent slopes	2,878	0.1
45	Rizno - Barx - Yarts Complex	112,781	5.5
46	Rizno - Cahona - Rock Outcrop Complex	33,500	1.6
47	Rizno - Littlenan - Bodot Association	69,344	3.3
48	Rizno - Mido Complex	5,225	0.2
49	Rizno - Rock Outcrop Complex	81,905	4.0
50	Rizno - Ruinpoint - Rock Outcrop Complex	63,065	3.0
51	Rizno - Skos - Rock Outcrop Complex	80,864	4.0
52	Rizno - Strych Association	10,097	0.5
53	Robroost family - Gypsumland Complex	7,241	0.4
54	Rock Outcrop - Piute - Sheppard Complex	98,930	4.7
55	Rock Outcrop - Piute - Skos Association	84,362	4.0
56	Rock Outcrop - Strych - Rizno Association	41,749	2.0
57	Rubble land - Rock Outcrop Complex	12,607	0.6
58	Ruinpoint - Cahona Association	30,822	1.5
59	Shalet - Moenkopie - Badland Complex	3,608	0.2
60	Skos channery fine sandy loam	3,865	0.2
61	Skos - Rock Outcrop Complex	3,026	0.1

TABLE PP-11 (Concluded)

Map Symbol	Name	Acres	Percent of Resource Area
62	Skos, warm - Rock Outcrop Complex	45,506	2.2
63	Strych - Rizno - Strych Association	36,336	1.7
64	Strych - Skos - Badland Complex	5,712	0.3
65	Strych - Skos, warm - Badland Complex	24,149	1.2
68	Yarts fine sandy loam, 5 to 30 percent slopes	1,406	0.1
	TOTAL	2,091,849	

Other Symbols

KBA	MdA
KAA	JAA
AACH	DAA, DAC, DdC
XAC	RAC
MAC	FAC
EAC	EKA, DACL
GEC	LCC
TbC	TCD
SSD	SAA, SIA
AAC	ECC
FL	FLAC, LTA
CkA	GAC

TABLE PP-12

Soil Map Units Meeting Criteria for Prime Farmland or Land Important to the State (7 CFR 657)

Map Unit Symbol	Map Unit Name
Soil Survey of Canyonlands Area	
KbA (MDA)	Barnum loam, 0 to 3 percent slopes
KAA (JAA)	Barnum silty clay loam, 0 to 3 percent clopes
PbC	Barx fine sandy loam, 2 to 6 percent slopes
AAC	Begay fine sandy loam, 2 to 6 percent slopes
AACH (DAA, DAC, DdC)	Begay fine sandy loam, moist, 2 to 6 percent slopes
AMD	Begay - Rizno complex, 3 to 15 percent slopes
AKF	Begay - Rock Outcrop - Mido complex, 2 to 35 percent slopes
DbC	Cahona fine sandy loam, 2 to 8 percent slopes
CdC	Hagerman very fine sandy loam, 2 to 8 percent slopes
QkCH	Ignacio - Leanto fine sandy loams, 2 to 6 percent slopes
QkCH	Ignacio - Leanto fine sandy loams, dry, 2 to 6 percent slopes
EAC (EKA, DACL)	Mivida fine sandy loam, 2 to 8 percent slopes
LAA	Redbank fine sandy loam, dry, 0 to 3 percent slopes
LAC	Redbank fine sandy loam, dry, 3 to 8 percent slopes
LbA	Redbank very fine sandy loam, 0 to 3 percent slopes
ZAC	Thoroughfare fine sandy loam, 2 to 8 percent slopes
Soil Survey of San Juan County, Central Part	
322 (312)	Barx very fine sandy loam, 1 to 4 percent slopes
431	Barx - Strych - Skos complex
102 (108)	Bluechief - Limeridge - Nakai complex, 1 to 6 percent slopes
402	Bookcliff - Bookcliff, dry complex
403	Bookcliff - Skos - Strych complex
342	Cahona very fine sandy loam, 1 to 8 percent slopes
231	Littlenan - Ruinpoint - Rizno association, 1 to 20 percent slopes
222 (11)	Milok fine sandy loam, 1 to 6 percent slopes
202 (203, 225)	Milok - Mivida complex
205	Milok - Skos - Strych complex
211 (204)	Mivida fine sandy loam, 1 to 6 percent slopes

TABLE PP-12 (Concluded)

Map Unit Symbol	Map Unit Name
217	Mivida - Pastern - Rock Outcrop complex, 1 to 8 percent slopes
134	Myton family - Nakai - Redhouse complex
111 (114,122)	Nakai fine sandy loam, 1 to 6 percent slopes
142	Nakai - Moffat - Sheppard Association
105	Recapture - Redbank family - Bankard family Association, 0 to 8 percent slopes
212	Redbank family - Riverwash - Green River family Association, 0 to 4 percent slopes
113	Redhouse fine sandy loam, 2 to 8 percent slopes
314	Rizno - Barx - Yarts complex
344	Rizno - Cahona - Rock Outcrop complex
244	Rizno - Ruinpoint - Rock Outcrop complex
242	Ruinpoint - Cahona Association

VEGETATION

LIST OF OVERLAYS

Vegetation zones.

RESOURCE OVERVIEW

Vegetation in the resource area is classified in four broad zones based on BLM inventory and mapping data available in the SJRA office. These zones are: (1) pinyon-juniper, (2) saltbush, (3) sagebrush, and (4) blackbrush. The zones are generally determined by a change in elevation, soils, and precipitation.

These broad zones can be further divided into 14 vegetation associations as shown in table PP-13. The first word in each association title is the predominant species in the association. Individual species commonly occurring in each association are listed.

Poisonous and noxious plants are present thoughout the resource area, but generally do not occur in concentrations that are a significant threat to livestock. These are discussed in more detail in Part II in the Grazing Management section.

Ecologically unique areas include some of the isolated mesa tops scattered throughout the area. These could be considered relict areas, since inaccessibility limits or precludes livestock and wildlife grazing. Van Pelt's study (1978) of some of these areas contains specific information.

Hanging gardens along seeps in canyons contain unique species confined to limited habitats. Holmgren (1976) described some of these plants.

Five plant species occurring in the resource area are considered sensitive. This means that they either are being considered for threatened or endangered status or may be considered for such status pending further investigation. These species are:

Astragalus cronquistii
Astragalus monumentalis
Erigeron kachinensis
Eriogonum clavellatum
Eriogonum humivagans

Occurrence of these species is shown on the Vegetation Zones overlay.

TABLE PP-13

Vegetation Associations

Zone	Vegetation Association	Habitat Type	Acres	Percent of Resource Area
Desert shrub	Desert shrub	shadscale, Mormon tea, blackbrush	47,696	2
Desert shrub	Desert shrub - grassland	Indian ricegrass, curlygrass, shadscale, fourwing saltbush	143,088	6
Desert shrub	Desert shrub - pinyon-juniper	shadscale, Mormon tea, blackbrush, pinyon pine, Utah juniper	95,392	4
Semidesert shrub	Semidesert shrub - grassland	fourwing saltbush, Mormon tea, blue gramma, Indian ricegrass, curlygrass	71,544	3
Semidesert shrub	Semidesert shrub - grassland	fourwing saltbush, blue gramma, Indian ricegrass, curlygrass, Wyoming sagebrush	23,848	1
Sagebrush	Sagebrush - pinyon-juniper	big sagebrush, curlygrass, needleandthread grass, Indian ricegrass, pinyon pine, Utah juniper	143,088	6
Pinyon-juniper	Pinyon-juniper - desert shrub	pinyon pine, Utah juniper, blackbrush, curlygrass	5,269	(less than 1)
Pinyon-juniper	Pinyon-juniper - saltbush	pinyon pine, Utah juniper, Nuttall saltbush, curlygrass, Indian ricegrass	166,936	7
Pinyon-juniper	Pinyon-juniper - sagebrush	pinyon pine, Utah juniper, Wyoming sagebrush	214,632	9
Pinyon-juniper	Pinyon-juniper - shrub	pinyon pine, Utah juniper, serviceberry	429,264	18
Pinyon-juniper	Pinyon-juniper - sagebrush - shrub	pinyon pine, Utah juniper, mountain sagebrush, Gambel oak	23,848	1
Blackbrush	Pinyon-juniper - blackbrush	pinyon pine, Utah juniper, blackbrush	23,848	1
Blackbrush	Desert shrub - blackbrush	shadscale, Mormon tea, blackbrush	524,656	22
Blackbrush	Semidesert shrub - blackbrush	fourwing saltbush, Mormon tea	476,960	20
		TOTAL	2,390,069	100

NOTE: Acreages and percentages include state lands and some private lands.

WATER

LIST OF OVERLAYS

Watershed Areas.
Ground Water.

RESOURCE OVERVIEW

Waters in the SJRA are used primarily for irrigation, municipal, and industrial purposes. Recreation and fish and wildlife uses are also important but, as a rule, do not consume appreciable quantities of water and are generally incidental to other uses (cross-reference: Wildlife, Part I, and Wildlife Habitat Management and Recreation Management, Part II). Stock watering likewise is important (cross-reference: Grazing Management, Part II). If water for livestock is not otherwise available, it is developed by various means on grazing ranges and other places of need, but quantities are not great (BOR, 1969).

SURFACE WATER

The SJRA lies entirely within the Colorado River drainage system. All stream channels within the resource area, with the possible exception of Indian Creek, are ephemeral or seasonal, with small segments near springs or headwaters having perennial flow. The drainage system is divided into three major parts. About 48 percent of the drainage area flows directly into the Colorado River or Lake Powell. About 52 percent flows into the San Juan River or the San Juan arm of Lake Powell. Less than 1 percent flows into the Dolores River system (see Watershed Areas overlay).

These drainage areas are further subdivided into subbasins for reporting purposes. Table PP-14 gives the acreage for each of these subbasins in the resource area. These subbasins with their respective codes were set up by the Water Resources Council, USGS, and SCS. They are the codes used in the State of Utah and USGS STORET computer program for water flow and water quality data.

Surface water drains freely within the SJRA. A dense system of ephemeral drainages is frequently comprised of relatively straight channels that are eroding in upper stream reaches and aggrading below. In areas with deep accumulations of sand and silt, channels are often deeply incised, with steep banks that slough and develop new headcuts in patterns perpendicular to the main stem. Where loosely consolidated material is shallow to bedrock, downward cutting has been impeded by the bedrock, and channel banks are rounding as they stabilize. Overall drainage patterns facilitate rapid drainage of precipitation.

Annual runoff in the resource area is generally less than 1 inch per year (cross-reference: Climate, Part I). Higher runoff occurs near the Abajo Mountains. Runoff occurs from snowmelt and from brief, high-intensity storms

TABLE PP-14

Watershed Areas

Major Watershed	Hydrologic Unit Code	Area (acres)	Extent (percent)
Upper Colorado River			47
	14030005	635,490	(19)
	14070001	922,731	(28)
Dolores River			less than 1
	14030002	10,496	less than 1
San Juan River			52
	14080201	646,875	(20)
	14080203	471,229	(14)
	14080205	526,127	(16)
	14080202	61,137	(2)

Source: BLM current field work (April 1985) that generally occur in late summer but can occur at any time of year. Major stream channels will carry runoff from winter snowmelt during spring and early summer. All stream channels will carry runoff during and after periods of brief, high-intensity storms. These storms are usually localized, and drainage systems in only part of the resource area are affected.

Table PP-15 gives the stream discharge measured at several gauging stations for several drainages in or near the SJRA. These values are quite variable between years and during the year. Runoff is concentrated during and a few days after the period of the storm event for most drainages. The range in volume of runoff carried by these drainages is no flow (or subsurface flow) to several thousand cfs for the drainages in desert and semidesert areas after a storm event. This could be expected, because over 50 percent of the surface area is composed of rock outcrop, badland, or soils with a high runoff potential. These peak runoff events affect water quality, sediment yield, and erosion conditions in the resource area.

Water quality data in the SJRA are extremely limited. Long-term water quality data are available only for the San Juan River gauging station near Bluff. Some grab sample data are available from the STORET computer system on some drainages.

Lake and reservoir depths have been considered for the State of Utah in the State Department of Health 1982 Clean Lakes Inventory and Classification (Utah, 1982). The only two water bodies in the resource area included in the report are the Blanding City Reservoir (Park Reservoir) and the Monticello Lake, located on private and USFS lands, respectively. Siltation rates were not included, but probably are not a serious concern, since the water is piped from sources in the Abajo Mountains to the storage facilities.

Annual and seasonal free water surface evaporation are depicted in figures PP-11 and PP-12 (NOAA, 1982). As would be expected, values are relatively high for this arid region, thus necessitating deep storage facilities for long-term availability.

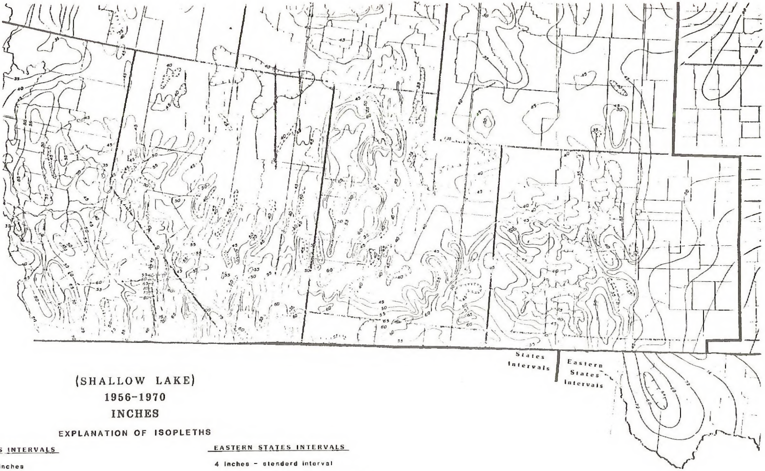
The most valuable supply of usable surface water in the SJRA comes from the Abajo Mountain area above 9,000 feet in elevation (BOR, 1969). This water is almost entirely composed of spring runoff. Very little surface runoff from summer thunderstorms in lower elevations is used beneficially. It is high in silt and is delivered with such intensity that small earthen structures cannot withstand forces associated with the flows. Use of such runoff is generally restricted to stock watering ponds located high enough in a drainage to prevent accumulations of excessive flows.

The watershed for most public drinking water sources in the resource area is located on National Forest land. The major exception to this is the recharge area for the Navajo aquifer, part of which is located below Comb Ridge. However, while this is a major aquifer in the area, it is uncertain that it is being tapped as a source of domestic water.

TABLE PP-15

Stream Discharge at Gauging Stations

Station No.	Name, Drainage Area	Period of Record	Runoff (cfs) Maximum	Runoff (cfs) Minimum	Runoff (cfs) Average
09379500	San Juan River near Bluff 23,000 mi 2	1914-1982	70,000	739	2,532
09378700	Cottonwood Wash near Blanding	1964-1982	20,500	---	8.26
09378650	Recapture Creek below Johnson Creek 50.2 mi 2	1975-1982	695	---	8.61
09378630	Recapture Creek near Blanding 3.77 mi 2	1965-1982	142	---	1.29
09378200	Montezuma Creek at Golf Course 17.6 mi 2	1979-1982	259	---	
09378100	North Creek above Ranger Station, Monticello 8.68 mi 2	1979-1982	69	---	
9-3345	White Canyon near Hite 276 mi 2	1950-1965	7,390	---	5.35
9-3787	Cottonwood Wash near Blanding 205 mi 2	1959-1964	8,650	---	
9-3790	Comb Wash near Bluff 280 mi 2	1959-1965	2,840	---	



(SHALLOW LAKE)
1956-1970
INCHES

EXPLANATION OF ISOPLETHS

WESTERN STATES INTERVALS

5 inches - < 80 inches
10 inches - > 80 inches
Interval irregular where crowded
----- Areas of limited data
-·-·- Additional information for areas of shallow gradient above 80 inches

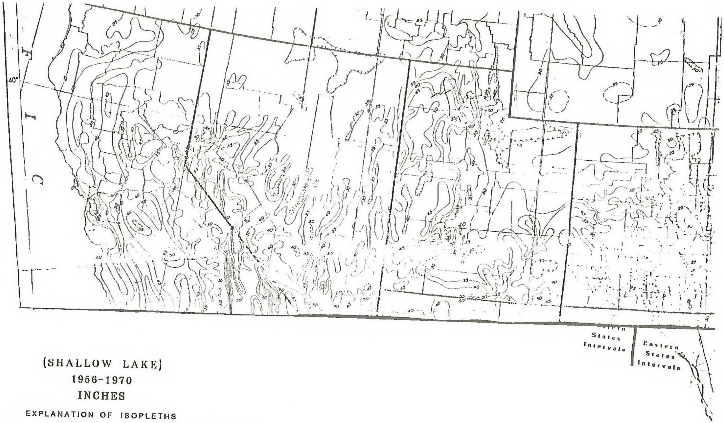
EASTERN STATES INTERVALS

4 inches - standard interval
——— 2 inch interval used for areas of shallow gradient

Source: NOAA, 1982.

FIGURE PP-11

Annual Free Water Surface Evaporation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(SHALLOW LAKE)
1956-1970
INCHES

EXPLANATION OF ISOPLETHS

WESTERN STATES INTERVALS

5 inches - < 80 inches
10 inches - > 80 inches
Interval irregular where crowded
----- Areas of limited data
-·-·- Additional information for areas of shallow gradient above 80 inches

EASTERN STATES INTERVALS

4 inches - standard interval
———— 2 inch interval used for areas of shallow gradient

Source: NOAA, 1982.

FIGURE PP-12

Free Water Surface Evaporation, May through October

Monticello draws its culinary water from springs in Spring, Verdure, North, and South Creeks. Blanding draws its culinary waters from wells and Indian Creek and Johnson Creek. Culinary water may be obtained from Recapture Dam upon its completion. Bluff draws its water from wells adjacent to the San Juan River. Mexican Hat draws its water from wells. Montezuma Creek draws its water from wells adjacent to the San Juan River. No municipal watershed is currently on lands in the resource area.

Both Monticello and Blanding have municipal water systems that store surface runoff for later use. These municipal reservoirs, as well as major irrigation reservoirs, are listed in tables PP-16 and PP-17 along with their water source and storage capacity. For the most part, water for these reservoirs is piped from USFS land to the storage facility, eliminating any interaction between BLM administered land and the water. A small portion of water for the Recapture project will drain from BLM land, and the community of Blanding will have rights to a portion of this water.

Abajo Mountain water is fully appropriated, and projects now under construction will utilize virtually all water available from that mountain in a normal year (Norman Nielson, President, San Juan Water Conservancy District, personal communication, January 1985). Demand for municipal water has remained static or declined some in the last 15 years as population growth has been hampered by a declining uranium market (Bud Nielson, Blanding City Manager and Rick Terry, Monticello City Manager, personal communications, January 1985). Increased water availability from new facilities now under construction will help eliminate the rationing of past years.

There is an unlimited demand for irrigation water in the SJRA that is not being met by available surface sources. Again, all surface water available for irrigation has been appropriated, and when those waters have been developed, there can be no more development unless it is for 0.25 acre of land or less (Mark Page, Area Engineer, Utah Division of Water Rights, personal communication, January 1985). The primary use of water in the SJRA, as in all southeastern Utah, is for irrigation. No BLM administered land in the SJRA, however, is now irrigated. The Bluff Bench project, if developed, would pump water from the San Juan River onto undeveloped BLM land to irrigate fruits and vegetables. It would not impact the current water supply, since it would have to work within existing appropriations.

Several attempts have been made in literature to quantify amounts of water being used for irrigation, as well as acres being irrigated. The land area being considered usually does not align perfectly with the SJRA, and therefore cannot be used without imposing inaccuracies. Also, the figures themselves are questionable because the amounts are so variable depending on the quantity of surface runoff for any particular year. Probably the most accurate assessment for the SJRA will be in a report being written by the Utah Division of Water Resources called Hydrologic Inventory of Utah's Southeastern Colorado River Basin which will consider just San Juan County (expected to be published by 1987).

TABLE PP-16

Existing Storage Reservoirs by Size

Name	Water Source	Location	Purpose	Capacity (acre-feet)	Comments
Lake Powell	Colorado River Deep Creeks	GCNRA, adjacent to SJRA	Multiple	27,000,000	
Nielson Reservoir	Iron Spring Oraw	Sec. 35, T. 32 S., R. 25 E.	Irrigation	1,436	Privately owned by Norman Nielson
Westwater Reservoir (Third City Reservoir)	Westwater Creek	Sec. 10, T. 36 S., R. 22 E.	Municipal (Blanding) and Recreation	275	A conservation pool is maintained for wildlife
Ougout Reservoir	Indian Creek	Sec. 13, T. 31 S., R. 21 E.	Irrigation	520	Privately owned by Robert Redd
Park Reservoir (Fourth City Reservoir)	Indian and Johnson Creeks	Sec. 9, T. 36 S., R. 22 E.	Municipal (Blanding)	680	A conservation pool is maintained for wildlife
Keller Reservoir	Spring Creek/ Vega Creek	Sec. 5, T. 33 S., R. 24 E.	Irrigation	206	Privately owned by Curtis Jones
Irrigation Pond, Large Pond, Small Pond	Springs high in Spring, North, South, and Verdure Creeks	Sec. 26 & 35, T. 33 S., R. 23 E.	Municipal (Monticello)	200	Three reservoirs with combined capacity of 200 acre-feet
Gordon Reservoir	Spring Creek/ Vega Creek	Sec. 16, T. 33 S., R. 23 E.	Irrigation	160	Privately owned by three ranchers
Dry Wash Reservoir	Dry Wash	Sec. 31, T. 34 S., R. 22 E.	Irrigation	130	Will hold up to 360 acre-feet
Camp Jackson Reservoir	Recapture Creek	Sec. 23, T. 35 S., R. 22 E.	Municipal (Blanding)	100	
Monticello Lake	Spring Creek	Sec. 23, T. 33 S., R. 22 E.	Recreation	27	Owned by UDWR
Foy Wash Reservoir	Foy Wash	Sec. 21, T. 33 S., R. 22 E.	Recreation	25	Owned by UDWR

TABLE PP-17

Reservoirs Currently Being Developed, by Size
(March 1985)

Name	Water Source	Location	Purpose	Capacity (acre-feet)	Comments
Recapture Reservoir	Recapture Creek	Sec. 18, T. 36 S., R. 23 E.	Irrigation	9,000	City of Blanding will have rights to some water
Lloyds Lake (Monticello Reservoir)	South Creek	Sec. 35, T. 33 S., R. 23 E. Sec. 2, T. 34 S., R. 23 E.	Municipal (Monticello) and Irrigation	3,500	Located above Monticello golf course
Starvation Reservoir	Indian and Johnson Creeks	Sec. 3 & 10, T. 36 S., R. 22 E.	Municipal (Blanding)	600	

A concern of local residents is the inability to develop additional new sources of water for irrigation because of existing laws governing allocations, when at the same time, there is talk of leasing mainstem Colorado River flow to San Diego, California (Norm Nielson, personal communication, January 1985).

Industrial uses of water within the SJRA are very minimal at this time. With unranium production down, the White Mesa mill in Blanding is virtually shut down; however, it is presently scheduled to reopen on October 1, 1985. The San Juan Conservancy District is considering the sale of 500 acre-feet of Recapture Reservoir water to UMETCO, operators of the White Mesa mill. The Aneth oil field uses water from the San Juan River for reinjection purposes. El Paso Natural Gas also uses water from the San Juan River. Incidental drilling operations utilize local water sources, but their use is temporary and is permitted through State Division of Water Rights. Other industrial users obtain water from municipal systems. The drain on water supplies from industry is minor, and any proposed new uses will have to acquire water within existing allocations.

Bureau surface water developments have included stock ponds, erosion control structures, rainfall catchments, and guzzlers. The objective has been to provide water for the complete and appropriate utilization of wildlife and livestock forage and to protect and enhance degrading watershed condition. Objectives have not always been met. Erosion control structures constructed in Beef Basin to heal a deeply incised channel that was advancing toward a road were not successful due to natural piping around the structures. They were prototype structures that were designed to serve as relatively inexpensive alternatives for gully erosion control and have been reinstalled with corrective measures to eliminate piping problems. Frequently, grazing permittees will construct small reservoirs by simply pushing up dirt without adequate engineering. Such structures have a fairly high rate of failure. Reservoirs that have been properly designed serve a useful purpose and usually meet their intended objective for an expected project life, which varies for each project. Locations of BLM projects, which include developed springs, wells, catchments, and reservoirs can be seen on the Land Treatments and Management Facilities overlay.

GROUND WATER

Ground water supplies are being considered more frequently as important means of reducing water shortages. The SJRA is no exception. Ground water development occurred extensively for irrigation in the 1950s and 60s, but has dropped off in the last 20 years and has been virtually nonexistent for at least the last 5 years (Mark Page, personal communication, January 1985). Ground water continues to be developed for single family dwellings, livestock, and irrigation of 0.25 acre of land or less. New large developments cannot occur under existing state law which states that Utah's portion of Colorado River drainage water is fully allocated (Mark Page, personal communication, January 1985).

Besides being used currently for irrigation, ground water has been tapped for municipal uses. The city of Blanding drilled several wells during the 1977 drought that are being used today for irrigation. In addition they have deeper wells, with good potable water that are not being used at this time (Bud Nielson, personal communication, January 1985).

Monticello has well water, but it is high in iron and manganese. It is used only for watering the parks and golf course, and only when high quality water is in limited supply due to culinary demand (Rick Terry, personal communication, January 1985). Montezuma Creek gets its water from wells along the San Juan River. Their system requires chlorination, suggesting it is fed from the San Juan River (Wayne Ball, Sanitarian, San Juan County, personal communication, January 1985). The town of Bluff pumps water from 500 to 550 feet into a 500,000-gallon storage tank which currently services 68 users. One of the three artesian wells used has arsenic concentrations that exceed state standards. By mixing this water with that of the other two wells, concentrations are brought within the allowable limitation (Wayne Ball, personal communication, January 1985). Mexican Hat obtains water from 80-foot-deep wells located 75 feet from San Juan River banks. The water is of good quality and is untreated.

Ground water use by single family dwellings has been increasing in recent years, according to Wayne Ball. Residents in the Monticello area are drilling 80 to 300 feet for water. In the Blanding area they can hit water at 70 to 80 feet, but are usually going to about 100 feet. This is a minimum depth required by the State of Utah when qualifying for development funding. Nitrate levels have been reported in wells north of Blanding that are on the border of being dangerous to babies 6 months old and younger.

Ground water continues to be developed for livestock water by both BLM and ranchers. Well yields for such purposes are held to 0.015 cfs by state law.

Ground water supplies are controlled more by recharge conditions than by use depletions. Precipitation is the ultimate recharge source. Areas with exposed permeable formations, where average annual precipitation is more than 12 inches, usually are recharge areas (USGS, 1984). Ground water moves from these areas of recharge and usually discharges to stream valleys. The discharged water either maintains streamflow or is evapotranspired.

Except for the Abajo Mountain areas where igneous rocks are exposed, the area is nearly all underlain by a series of consolidated sedimentary formations that will transmit water and yield it to wells and springs (cross-reference: Geology, Part I). The formations that are aquifers or contain members that are aquifers, listed in descending order are: Dakota Sandstone; Burro Canyon and Morrison Formations; Bluff, Entrada, Navajo, and Wingate sandstones; Cedar Mesa Sandstone of the Cutler Group, and Hermosa Group. The formations are encountered at depths ranging from surface outcrops to more than 2,000 feet.

Quantitative appraisals of regional aquifer systems in the Upper Colorado River Basin have been lacking. This is even more true of the rather remote San Juan County portions than other parts of the Basin. Feltis (1966), in his study of ground water in the Colorado Plateau, divided the area into three sections. The largest section he called Canyon Lands which encompassed an area from Price, Utah on the north to the Arizona border on the south. Out of that area he noted "...The area of greatest development of ground water...is in the Blanding Basin in southeastern, San Juan County."

The Blanding Basin, whose western border is approximated by Comb Ridge, is underlain by the Glen Canyon Group, which is exposed in areas with high recharge potential. Exposure and extent of this aquifer is shown on the ground water overlay. The group consists of the Navajo, Kayenta, and Wingate Formations. This widespread sequence of predominantly sandstone is one of the most important aquifers in the SJRA, because it generally yields fresh water to springs and, in many areas, yields good quality well water (Feltis, 1966).

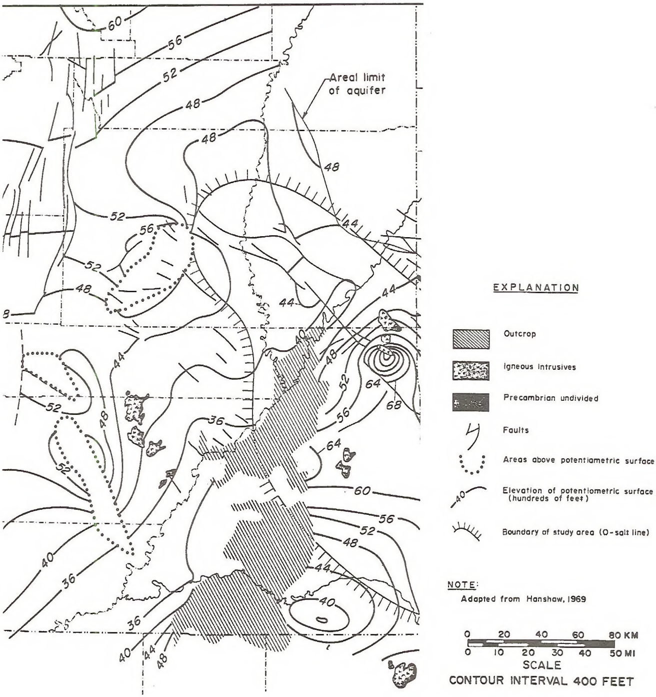
Above the Glen Canyon Group lie the Entrada Sandstone and the Morrison Formation (cross-reference: Geology, Part I). The Entrada is a reservoir for water, oil, and gas (USGS, 1984). The areal extent of these aquifers is shown with the Glen Canyon Group on the Ground Water overlay.

The upper part of the Morrison, Dakota, Burro Canyon, and equivalent formations comprise an upper hydrogeologic aquifer, the extent of which is also shown on the ground water overlay. The individual aquifers in this unit are thin and discontinuous. Due to their fine-grained nature, water yield from these aquifers is a function of fracturing, which varies throughout their extent. The Dakota is the most important aquifer in this unit.

A large portion of the SJRA does not contain the aquifers discussed to this point. This area, also shown on the Ground Water overlay, consists of formations that are typically lower in the stratigraphic column than any formations discussed so far. They make up the Permian System and are composed of the Cedar Mesa Sandstone of the Cutler Formation. Figure PP-13 shows where the Permian System outcrops, and the accompanying potentiometric contours show direction of ground water movement. Water moves in the direction of decreasing potentiometric gradient. Sandstone units contain fresh or slightly saline to briny water, depending on locality, depth of burial, and rate of ground water flow (USGS, 1983).

The Hermosa Group lies beneath the Permian System (cross-reference: Geology, Part I). In the Paradox Basin it is not important as an aquifer, but rather contains thick saline series consisting of mainly halite (common salt), which locally contributes to the degradation of water quality in adjacent aquifers and some streams (USGS, 1983). A spring in T. 33 S., R. 16 E., however, attests to the good quality water this aquifer can contain in some areas (Feltis, 1966). Deeper aquifers contain saline and brine water, with only local areas of fresh water, and interest in them is mainly for their potential reservoirs of oil.

The quality of water from bedrock aquifers varies widely over the area. As a rule, the salt content ranges from 200 to 8,000 p/m. The amount of TDS generally increases with distance from the recharge area and is less in the more permeable aquifers. Water chemically suitable for culinary use can be obtained from bedrock aquifers over the greater part of the resource area (BOR, 1969).


Areal limit of aquifer
60
56
52
48
48
48
52
56
52
48
44
44
44
40
48
52
56
64
68
64
36
44
48
52
52
60
56
52
48
44
40
40
36
36
40
44
48
EXPLANATION
Outcrop
Igneous intrusives
Precambrian undivided
Faults
Areas above potentiometric surface
Elevation of potentiometric surface (hundreds of feet)
Boundary of study area (O-salt line)
NOTE:
Adapted from Hanshaw, 1969
0 20 40 60 80 KM
0 10 20 30 40 50 MI
SCALE
CONTOUR INTERVAL 400 FEET

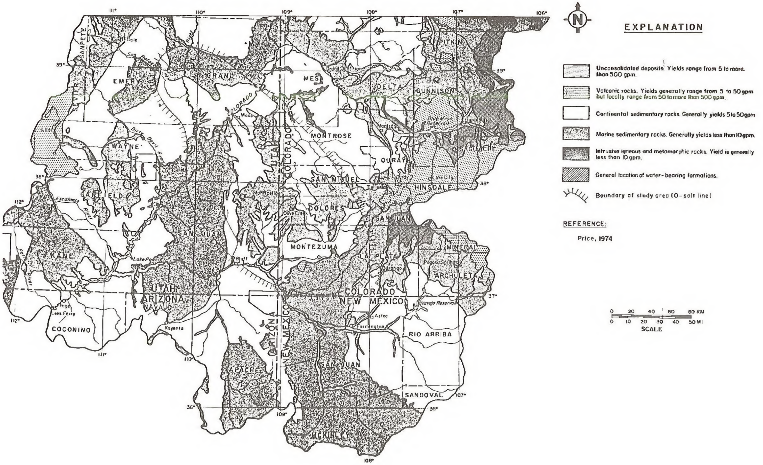
Source: Bechtel National, Inc., 1979

FIGURE PP-13

Potentiometric Map of the Permian Formations (Undifferentiated)

Availability of ground water to meet future water needs has been determined (Bechtel National, Inc., 1979). The perennial ground water supply for the entire Upper Colorado Region is about 4 million acre-feet. The recoverable reserve of ground water in storage in the upper 100 feet of saturated rocks may be as much as 115 million acre-feet. Yet, in 1970, only about 2 percent of the estimated total amount of water used in the region came directly from ground water sources. Within the SJRA this is probably proportionately true. Figures PP-14 through PP-18 show the Four Corners portion of the Upper Colorado Region and the distribution of the geohydrologic units, areas of recoverable ground water, potential yields to wells, depth to ground water, and concentrations of TDS in ground water, respectively.

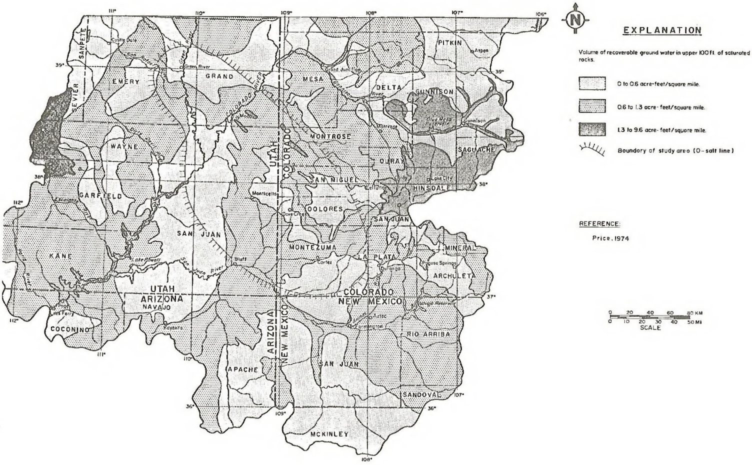
Withdrawals of ground water by wells apparently have not had a widespread significant effect on ground water levels. The few long-term water level records available for various parts of the region indicate that the changes in ground water levels are caused chiefly by changes in the annual supply of natural recharge from precipitation. Local depletions of ground water storage by pumping are probably more than offset regionally by the increased storage resulting from bank storage around new reservoirs, such as Lake Powell. Because of the close relationship between surface water and ground water, however, large-scale ground water withdrawal over a long period of time would intercept water that naturally enters streams. This could ultimately reduce the flow of the Colorado River, but state water rights laws would prevent overallocations that would deplete ground water flow to the Colorado River to this degree.


N
EXPLANATION
Unconsolidated deposits. Yields range from 5 to more than 500 gpm.
Volcanic rocks. Yields generally range from 5 to 50 gpm but locally range from 50 to more than 500 gpm.
Continental sedimentary rocks. Generally yields 5 to 50 gpm
Marine sedimentary rocks. Generally yields less than 10 gpm.
Intrusive igneous and metamorphic rocks. Yield is generally less than 10 gpm.
General location of water-bearing formations.
Boundary of study area (O-salt line)
REFERENCE:
Price, 1974
0 20 40 60 80 KM
0 10 20 30 40 50 MI
SCALE
111°
110°
109°
108°
107°
106°
39°
38°
37°
36°
112°
SANPETE
SEVIER
EMERY
GRAND
MESA
DELTA
PITKIN
GUNNISON
WAYNE
GARFIELD
MONTROSE
OURAY
SAGUACHE
SAN MIGUEL
HINSDALE
DOLORES
SAN JUAN
KANE
MONTEZUMA
LA PLATA
MINERAL
ARCHULETA
UTAH
ARIZONA
NAVAJO
COLORADO
NEW MEXICO
COCONINO
RIO ARRIBA
APACHE
SANDOVAL
MCKINLEY
Moab
Grand Junction
Montrose
Gunnison
Telluride
Lake City
Monticello
Cortez
Durango
Pagosa Springs
Aztec
Farmington
Kayenta
Page
Lees Ferry
Lake Powell
Navajo Reservoir
Blue Mesa Reservoir
Escalante River
Dirty Devil River
Colorado River

Source: Bechtel National, Inc., 1979

FIGURE PP-14

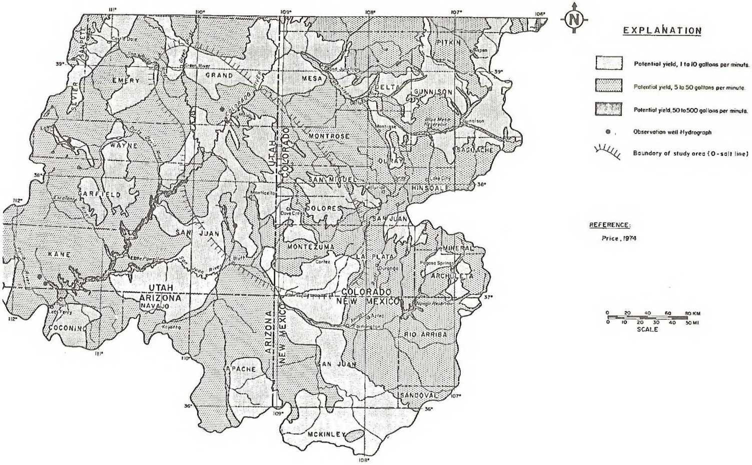
Geohydrologic Units Based on Water-Bearing Properties of the Rocks in the Upper Colorado Water Resource Region


EXPLANATION
Volume of recoverable ground water in upper 100 ft. of saturated rocks.
0 to 0.6 acre-feet/square mile.
0.6 to 1.3 acre-feet/square mile.
1.3 to 9.6 acre-feet/square mile.
Boundary of study area (0-salt line)
REFERENCE:
Price, 1974
0 20 40 60 80 KM
0 10 20 30 40 50 MI
SCALE
SANPETE
SEVIER
EMERY
GRAND
WAYNE
GARFIELD
KANE
SAN JUAN
MESA
DELTA
PITKIN
GUNNISON
MONTROSE
OURAY
SAGUACHE
SAN MIGUEL
HINSDALE
DOLORES
SAN JUAN
MONTEZUMA
LA PLATA
MINERAL
ARCHULETA
UTAH
ARIZONA
COLORADO
NEW MEXICO
NAVAJO
COCONINO
APACHE
SAN JUAN
RIO ARRIBA
SANDOVAL
McKINLEY
Castle Dale
Green River
Grand Junction
Aspen
Gunnison
Montrose
Blue Mesa Reservoir
Lake City
Telluride
Monticello
Dove Creek
Cortez
Durango
Pagosa Springs
Navajo Reservoir
Aztec
Farmington
Bluff
Lake Powell
Kayenta
Page
Lees Ferry
Colorado River
Gunnison River
San Juan River
Green River
Escalante River
Dirty Devil River
Paria River
San Rafael River
Moab
106°
107°
108°
109°
110°
111°
112°
36°
37°
38°
39°

Source: Bechtel National, Inc., 1979

FIGURE PP-15

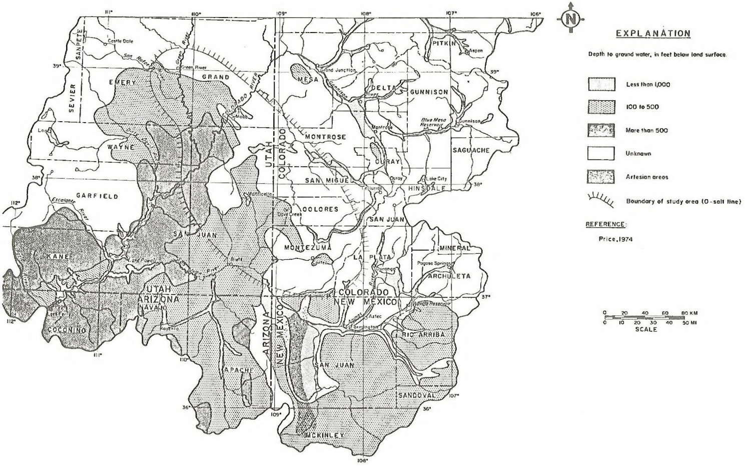
Areas of Recoverable Ground Water, Upper Colorado Water Resource Region


EXPLANATION
Potential yield, 1 to 10 gallons per minute.
Potential yield, 5 to 50 gallons per minute.
Potential yield, 50 to 500 gallons per minute.
Observation well Hydrograph
Boundary of study area (0-salt line)
REFERENCE:
Price, 1974
SCALE
0 20 40 60 80 KM
0 10 20 30 40 50 MI
N
111°
110°
109°
108°
107°
106°
39°
38°
37°
36°
112°
UTAH
COLORADO
ARIZONA
NEW MEXICO
SANPETE
SEVIER
EMERY
GRAND
MESA
DELTA
PITKIN
GUNNISON
MONTROSE
WAYNE
OURAY
SAGUACHE
SAN MIGUEL
HINSDALE
GARFIELD
DOLORES
SAN JUAN
MONTEZUMA
LA PLATA
MINERAL
ARCHULETA
KANE
NAVAJO
COCONINO
APACHE
RIO ARRIBA
SANDOVAL
MCKINLEY
Castle Dale
Green River
Grand Junction
Moab
Aspen
Gunnison
Blue Mesa Reservoir
Montrose
Ouray
Lake City
Telluride
Monticello
Dove Creek
Cortez
Durango
Pagosa Springs
Navajo Reservoir
Aztec
Farmington
Bluff
Kayenta
Lees Ferry
Colorado River
San Juan River
Dirty Devil River
Escalante River
Lake Powell

Source: Bechtel National, Inc., 1979.

FIGURE PP-16

Potential Yields to Properly Located, Properly Constructed Wells in the Upper Colorado Water Resource Region


N
EXPLANATION
Depth to ground water, in feet below land surface.
Less than 1,000
100 to 500
More than 500
Unknown
Artesian areos
Boundary of study area (0-salt line)
REFERENCE:
Price, 1974
0 20 40 60 80 KM
0 10 20 30 40 50 MI
SCALE
111°
110°
109°
108°
107°
106°
39°
38°
37°
36°
112°
SANPETE
SEVIER
EMERY
GRAND
WAYNE
GARFIELD
KANE
SAN JUAN
UTAH
ARIZONA
NAVAJO
COCONINO
APACHE
COLORADO
NEW MEXICO
MESA
DELTA
GUNNISON
PITKIN
MONTROSE
SAGUACHE
OURAY
SAN MIGUEL
HINSDALE
DOLORES
SAN JUAN
MONTEZUMA
LA PLATA
MINERAL
ARCHULETA
RIO ARRIBA
SAN JUAN
SANDOVAL
McKINLEY
Castle Dale
San Rafael River
Green River
Green River
COLORADO RIVER
Moab
Grand Junction
Gunnison River
Aspen
Gunnison
Blue Mesa Reservoir
Montrose
Ouray
Telluride
Lake City
Dove Creek
Monticello
Cortez
Durango
Pagosa Springs
Aztec
Farmington
Navajo Reservoir
Escalante River
Dirty Devil River
Lake Powell
San Juan River
Bluff
Kayenta
Loa

Source: Bechtel National, Inc., 1979.

FIGURE PP-17

Depths to Ground Water in the Upper Colorado Water Resource Region

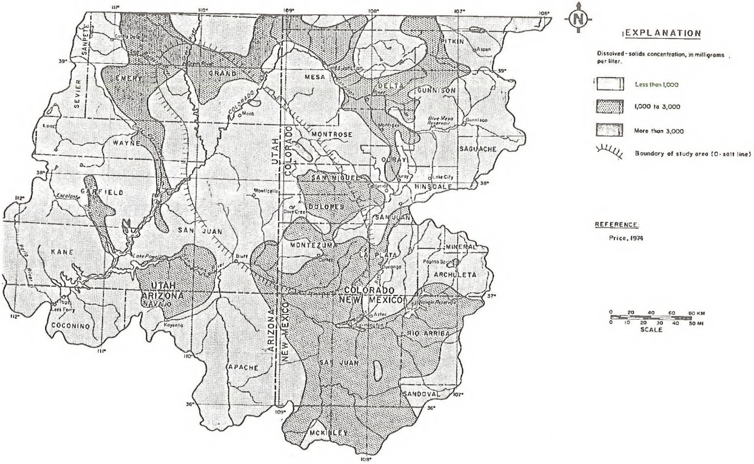

EXPLANATION
Dissolved-solids concentration, in milligrams per liter.
Less than 1,000
1,000 to 3,000
More than 3,000
Boundary of study area (0-salt line)
REFERENCE:
Price, 1974
0 20 40 60 80 KM
0 10 20 30 40 50 MI
SCALE
N
111°
110°
109°
108°
107°
106°
39°
38°
37°
36°
112°
SANPETE
SEVIER
EMERY
GRAND
MESA
PITKIN
DELTA
GUNNISON
WAYNE
MONTROSE
SAGUACHE
OURAY
SAN MIGUEL
HINSDALE
GARFIELD
DOLORES
SAN JUAN
MONTEZUMA
LA PLATA
MINERAL
ARCHULETA
KANE
UTAH
ARIZONA
NAVAJO
COLORADO
NEW MEXICO
COCONINO
APACHE
RIO ARRIBA
SAN JUAN
SANDOVAL
MCKINLEY
Castle Dale
Green River
Grand Junction
Aspen
Moab
Montrose
Blue Mesa Reservoir
Gunnison
Loa
Ouray
Lake City
Telluride
Monticello
Dove Creek
Cortez
Durango
Pagosa Springs
Bluff
Lake Powell
Escalante
Paria River
Page
Lees Ferry
Kayenta
Aztec
Farmington
Navajo Reservoir
Colorado

FIGURE PP-18

Concentration of Dissolved Solids in Ground Water, Upper Colorado Water Resource Region

Withdrawals of ground water by wells apparently have not had a widespread significant effect on ground water levels. The few long-term water level records available for various parts of the region indicate that the changes in ground water levels are caused chiefly by changes in the annual supply of natural recharge from precipitation. Local depletions of ground water storage by pumping are probably more than offset regionally by the increased storage resulting from bank storage around new reservoirs, such as Lake Powell. Because of the close relationship between surface water and ground water, however, large-scale ground water withdrawal over a long period of time would intercept water that naturally enters streams. This could ultimately reduce the flow of the Colorado River, but state water rights laws would prevent overallocations that would deplete ground water flow to the Colorado River to this degree.

WILDLIFE

LIST OF OVERLAYS

Wildlife Habitat: Bighorn/Antelope/Ferret
Wildlife Habitat: Deer/Aquatic/Riparian

RESOURCE OVERVIEW

Over 460 terrestrial and aquatic wildlife species (Dalton, et al., 1978) are found in the Moab District. Discussion will be limited to those species and areas in the SJRA for which habitat is managed. These are:
(1) major terrestrial species (desert bighorn sheep, pronghorn antelope, deer, and elk), (2) riparian habitat; and (3) threatened and endangered species (bald eagle, black-footed ferret, peregrine falcon, and some fish species found in the San Juan River).

Golden eagle, ferruginous hawk, prairie falcon, and other species of high federal interest also inhabit the resource area. Because specific data for these species are lacking, they will not be discussed further.

MAJOR TERRESTRIAL SPECIES

Desert Bighorn Sheep

Desert bighorn sheep are found in the southern, western and northwestern portions of the resource area (see the Wildlife Habitat: Bighorn/Antelope/Ferret overlay). These locations primarily include areas adjacent to the San Juan River and areas adjacent to the GCNRA and CNP.

Desert bighorn sheep are native to the area. Petroglyphs recorded their presence as early as A.D. 1300, and they were also mentioned in the records of Father Escalante in 1776, John Wesley Powell in 1869, and the early Mormon pioneers in 1879 (Jense, 1983).

Bighorn sheep require large areas of land with steep, rugged slopes. It has been observed (King and Workman, 1983) that rams show fidelity to breeding areas from year to year, as do ewes to lambing areas.

Population estimates were derived through the cooperative efforts of UDWR and BLM personnel. The resource area's current bighorn sheep population, the largest in Utah, is estimated to be 1,390 (of which 1,102 inhabit public lands and 288 inhabit NPS managed lands). The prior stable number, which is also UDWR's long-term management goal, is estimated at 6,247. Table PP-18 shows the estimated current and prior stable populations and trend for bighorn sheep on BLM grazing allotments within the SJRA.

TABLE PP-18

Estimated Current and Prior Stable Desert Bighorn Sheep Populations and Trend, by Grazing Allotment

Grazing Allotment	Estimated Current Population	Estimated Prior Stable Population	Trend
Harts Draw	50	200	Increasing
Hurrah Pass (South)	10	58	Increasing
Indian Creek	530	1,106	Increasing
Lower Indian Creek Pasture[a]	(10)	(58)	
Beef Basin Pasture	(280)	(486)	
Dark Canyon Plateau Pasture	(240)	(509)	
Lake Canyon	250	1,883	Increasing
Perkins Brothers	20	340	Increasing
Slickhorn	50	837	Increasing
Texas Muley	2	36	Increasing
White Canyon	190	908	Increasing
TOTAL	1,102	5,368	

NOTE: When bighorn sheep residing on NPS lands are added, estimated current population totals 1,390, and estimated prior stable population totals 6,247.

[a] The pastures in the Indian Creek Allotment are shown here to provide a breakdown in location of the estimated 530 bighorn residing on that allotment. The numbers in parentheses should not be added into the totals.

Source: Population estimates were calculated through cooperative efforts of UDWR and BLM personnel.

An increasing trend in population is observed, and bighorn sheep in the resource area appear healthy, despite the occurrence of positive titers for blue tongue and contagious ecthyma (King and Workman, 1983). Contagious ecthyma can be a serious problem if it is severe enough and occurs at critical times; lamb production can be reduced if the disease occurs during the breeding or lambing seasons. No lasting detrimental effects were observed in the Blue Notch area, where the disease was first documented in Utah. In fact, these cases occurred in September and October, just prior to the rut, and seven of the eight ewes affected had lambs the following spring.

Despite the increasing population trend observed, lamb mortality is a significant factor in the vigor of bighorn populations in southeastern Utah. Lamb to ewe ratios show a marked decline from summer through fall (King and Workman, 1983). In 1983 the summer ratio was 72 lambs to 100 ewes; by November the ratio was 45 lambs to 1200 ewes. Respiratory problems such as pneumonia are common to other bighorn populations, and several lambs were observed coughing severly in late September (King and Workman, 1983).

Pronghorn Antelope

Pronghorn antelope are present in the northwestern portion of the resource area (see the Wildlife Habitat: Bighorn/Antelope/Ferret overlay). Their habitat includes the Hatch Point and Dry Valley areas. Antelope prefer to occupy areas with large tracts of flat to rolling open terrain where they can rely on their keen eyesight and swift movement to avoid predators or other intruders into their habitat.

A herd of 172 antelope were introduced into the Dry Valley area in 1971. This new population appeared to respond favorably for the first 3 years following their intorduction. Preseason fawn to doe ratios were high, with 62, 122, and 68 fawns per 100 does in 1972, and 1974. Winter trend counts also indicated that the herd was increasing. But since 1975 the population has declined. Preseason fawn to doe ratios dropped below 10 fawns per 100 does, and trend counts indicated a declining population below 10 fawns per 100 does, and trend counts indicated a declining population (Jense, et al., 1984). In 1983 the fawn to doe ratio increased to 29 fawns per 100 does (see table PP-19). It is thought that productivity must be at least 40 fawns per 100 does for a population to maintain itself.

The estimated 1984 population for the Dry Valley area is 50 head. The prior stable population (or UDWR's long-term herd management goal) for the Hatch Point herd is 309 antelope. These estimates were derived through the cooperative efforts of UDWR and BLM personnel.

Deer

Deer inhabit the major portion of the resource area, and they are also the most common big game species present (see Wildlife Habitat: Deer/Aquatic/Riparian overlay). Most of the deer habitat within the resource area is winter range, and the majority of the population winter at the lower elevations (6,000 to 7,000 feet) on pinyon-juniper-sagebrush and agricultural vegetation types adjacent to the Manti-LaSal National Forest.

TABLE PP-19

Preseason Antelope Classification and Aerial Trend Count

ANETLOPE HERD UNIT 12 - HATCH POINT

PRESEASON CLASSIFICATION

Year	Bucks	Does	Fawns	Total	Fawns/ 100 Does	Bucks/ 100 Does
1972	17	56	35	108	62	30
1973	37	31	38	106	122	119
1974	72	112	76	260	68	64
1975	49	152	40	241	26	32
1976	50	180	14	244	8	28
1977	44	230	10	284	4	19
1978	18	118	9	145	8	15
1979	23	204	26	253	17	14
1980	20	122	15	157	12	16
1981	27	156	13	196	11	8
1982	No count					
1983	21	96	28	145	29	21

AERIAL TREND COUNT

Transect	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Hatch Point	141	127	80	110	68	91	68	74	57	*

*Didn't fly

Source: Jense, et al., 1984.

Deer population estimates were derived through cooperative efforts of BLM and UDWR personnel and are shown in table PP-20.

The populations appear to be increasing in both herd units, as evidenced by high fawn production (see table PP-21). Fawn production is approaching its highest level in the past 13 years (Jense, et al., 1984). The postseason buck to doe ratio, at 60 bucks to 100 does, has doubled since last year. A substantial proportion of the bucks are 3.5 years old or older (Jense, et al., 1984).

Elk

A small population of elk inhabit Manti-LaSal National Forest adjacent to the resource area. Elk were not introduced into the area; they apparently migrated from Colorado. The resource area provides winter habitat for a few of these elk on the Peters Point, Peters Canyon, Hart Draw, and White Canyon grazing allotments (see the allotment overlay). Most of the elk spend the entire year on the National Forest.

The resource area has never provided year-round habitat for elk.

The current population of elk wintering in the resource area is approximately 25 head, and the trend appears to be toward an increase. As the elk population increases, use on public lands will increase proportionately. The potential AUMs of use cannot be predicted at this time. Because the number of elk is insignificant, the BLM does not manage habitat for them. The MSA will not consider elk or elk habitat further. At such time that management of elk habitat on public lands within SJRA becomes a concern, the MSA will be updated and the RMP modified if necessary.

RIPARIAN AND AQUATIC HABITATS

The riparian and aquatic areas provide habitat for a variety of game and nongame species (see table 4350-5 in Wildlife Habitat Management, Part II; see also Deer/Aquatic/Riparian overlay). Birds, mammals, fish, reptiles, amphibians, and lower forms of life can all be found within this typically narrow (20 to 200 feet), elongated area.

Riparian habitats are also preferred by livestock because they provide reaily available water, palatable vegetation, usually more gently sloping terrain, shade for cooler temperatures during the summer, and shelter for thermal cover during the winter. The vegetation found within these areas consists of Fremont cottonwood, tamarisk, narrowleaf cottonwood, water birch, willow, sedges, rushes, and a variety of perennial grasses and forbs (cross-reference: Vegetation, Part I).

Aquatic habitats are areas of permanent or semipermanent water found in rivers, perennial streams, spring-fed ponds, or lakes and reservoirs. These habitats vary in size, temperature, turbidity, and velocity. They are inhabited by various vertebrate and invertebrate species.

TABLE PP-20

Estimated Current and Prior Stable Mule Deer Populations and Trends, by Herd Unit

Herd Unit	Estimated Current Population	Estimated Prior Stable[a] Population	Trend
31A	9,200	23,000	Increasing
31B	3,560	17,000	Increasing

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[a] The estimated prior stable population is also UDWR's long-term management goal.

Source: Populations were estimated through cooperative efforts of UDWR and BLM personnel.

TABLE PP-21

Preseason and Postseason Mule Deer Classification, by Herd Unit

31a PRESEASON AND POSTSEASON CLASSIFICATION

	Bucks		Does		Fawns		Total		Fawns/ 100 Does		Bucks/ 100 Does
Year	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Post
1972	80		268		266		614		99		
1973	78		214		214		506		100		
1974	161		353		327		841		92		
1975	29	37	153	272	165	286	347	595	108	105	14
1976	52	24	198	221	172	140	422	385	87	63	11
1977	77	39	382	302	264	202	723	543	69	67	13
1978	22	22	105	186	75	123	202	331	71	66	12
1979	50	21	168	117	86	66	304	204	51	56	17
1980	72	21	151	129	115	90	338	240	76	70	16
1981	155	28	208	182	153	129	516	339	74	71	15
1982	44	23	99	109	81	108	228	244	82	99	21
1983	15	17	98	115	89	111	207	270	90	97	15

31b PRESEASON AND POSTSEASON CLASSIFICATION

	Bucks		Does		Fawns		Total		Fawns/ 100 Does		Bucks/ 100 Does
Year	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Post
1973	72		202		135		409		67		
1974	163		368		289		820		78		
1975	132	30	299	175	263	164	694	369	88	94	17
1976	67	35	260	281	156	156	483	472	60	56	12
1977	84	44	234	245	97	122	415	411	41	50	18
1978	29	29	109	253	63	106	201	388	58	42	11
1979	29	15	111	142	60	69	200	226	59	48	10
1980	32	35	104	155	81	108	217	298	78	70	23
1981	64	64	128	183	79	144	271	391	62	79	35
1982	28	26	99	96	86	85	216	242	86	89	27
1983	65	50	84	83	74	76	239	209	88	92	60

Source: Jense, et al., 1984

Both introduced and native fish species are found in the resource area. The introduced fish species present include carp, channel catfish, black bullhead, white sucker, largemouth bass, bluegill sunfish, and green sunfish. These fishes were introduced for sport purposes. Others, such as the red shiner, sand shiner, fathead minnow, and killifish, were probably introduced when bait fish were dumped into the Colorado River system.

The native fish species present include roundtail chub, bonytail chub, humpback chub, Colorado squawfish, speckled dace, flannelmouth sucker, bluehead sucker, and humpback sucker. Indian Creek supports trout fisheries.

THREATENED AND ENDANGERED ANIMAL SPECIES

Bald Eagle

The bald eagle (classified as endangered) is a winter resident in the SJRA. It arrives in October or November and returns to its northern breeding grounds by March or April. Its winter habitat is fairly widespread through the resource area. Most wintering bald eagles are sighted near water or along drainages with cottonwood trees (see the Wildlife Habitat: Deer/Aquatic/Riparian overlay).

An annual bald eagle count has been conducted jointly by BLM, FWS, and UDWR over the past 5 years. The eagle population in the resource area appears stable. Ten birds were observed in 1983.

Black-Footed Ferret

The black-footed ferret (classified as endangered) has been confirmed historically in the SJRA, but not recently. Durrant (1952) identified a single specimen taken April 21, 1937 from south of Blanding. Fontenbery (1971) reported a black-footed ferret which had been killed by a dog in 1954 northeast of Monticello (see also Hinckley, 1970 and FWS, 1983.)

Black-footed ferret habitat is also prairie dog habitat; white-tailed prairie dog colonies have been found within the resource area (see the Bighorn/Antelope/Ferret overlay). The Prairie dog is the primary food source of the black-footed ferret. Table PP-22 lists prairie dog colonies in the SJRA, their size, and the potential for occurrence of black-footed ferrets. It is possible that black-footed ferrets could inhabit areas with dense populations of other ground burrowing rodents that would provide a food supply.

Peregrine Falcon

The peregrine falcon (classified as endangered) may be a yearlong resident of the SJRA. There is also evidence that migrant birds inhabit the area during the fall and spring. Peregrine falcons generally select a nest site within 1 mile of a stream, river, or spring and prefer to nest in cliffs at least 100 feet high.

TABLE PP-22

Mapped White-Tailed Prairie Dog Colonies, Size, and Potential for Occurrence of Black-Footed Ferrets

Colony Name	Size (acres)	Potential
Black Mesa	45	None
Big Indian	164	Low
Mail Station	104	Low
East Canyon	167	Moderate
Iron Canyon Point	26	Moderate
Lightning Draw	835	Moderate
Murphy Point	63	Moderate
White Mesa	807	Moderate

Source: FWS, 1983.

The current population of peregrine falcons in southeastern Utah is unknown; however, peregrine falcon populations have declined in Utah as they have nationally (Porter and White, 1973; FWS 1983). Historically, 40 pairs of peregrines are known to have nested in Utah. In 1978 only three of those nest sites were occupied. Possible explanations for the decline include climatic changes, human disturbance, disease, and pesticides. Pesticide applications in the late 1940s and 1950s have been linked to poor reproduction and undoubtedly account for the dramatic decline of peregrine populations in Utah.

San Juan River Threatened and Endangered Fish

The San Juan River is historical range for humpback chub, bonytail chub, Colorado squawfish and humpback sucker. The humpback chub and bonytail chub are listed as endangered. Both species may still be present; however, they have not been reported. The colorado squawfish, listed as endangered, has been reported in recent years. In 1978 one was caught by seine near Mexican Hat, Utah. The humpback sucker, listed as sensitive, has also been reported. One was found in an irrigation pond near Bluff, Utah in 1976.

River conditions have been altered, primarily by water flow regulation imposed by the Navajo Dam near Farmington, New Mexico, completed in 1962. As a result, the introduced species have been more successful, and the native species have declined (Twedt and Holder, 1980).

LAND TREATMENTS AND MANAGEMENT FACILITIES

LIST OF OVERLAYS

Land Treatments and Management Facilities

RESOURCE OVERVIEW

BLM land treatments and management facilities in the SJRA include those used for range management, recreation, and communications. Table PP-23 lists range and communications facilities and shows the number, condition, and maintenance responsibility for each type.

Range management treatments and facilities include seedings, fences, corrals and water developments (cross-reference: Water, Part I and Grazing Management, Part II). Most of the seedings in the area were completed in pinyon-juniper areas, with the remainder in sagebrush areas (cross-reference: Vegetation, Part I). Most were completed in the period between 1958 and 1965, but some were completed as early as 1951 and as late as 1972. Many are reverting to the original pinyon-juniper or sagebrush vegetative type and are in poor condition. Most were funded by a combination of BLM, permittee, Grazing Advisory Board, and UDWR funds, with the majority in most cases BLM funds. Some of the smaller seedings (fewer than 400 acres) were funded entirely by the grazing permittees under range improvement permits, which give them full title to and interest in the improvement (including its maintenance).

Fences and pipelines have generally been constructed with a combination of BLM and permittee funds. Springs and water catchments have mostly been constructed and funded by BLM. Wells, reservoirs, and corrals have usually been constructed and funded by the permittees, with some funding provided by the Grazing Advisory Board.

Construction and funding of future range improvements could be exclusively by BLM or grazing permittees or by a combination of BLM, permittee, and Grazing Advisory Board funds and efforts.

Communications facilities include 2-way radio base stations at Monticello and Kane Gulch Ranger Station, transmitter-receivers on Abajo Peak and Bears Ears, and repeating stations at Bullet Canyon and Polly's Island. The repeaters are used for radio transmissions in Grand Gulch. Radio communications are generally good in the SJRA, but are limited by topography (cross-reference: Topography, Part I). "Dead spots" where radio communication is not possible have not been mapped. These generally occur in the western part of the resource area, or in canyons or similar places where topography blocks radio signals.

BLM field cabins are located on Dark Canyon Plateau and in Beef Basin. These two cabins are used by employees when working in these remote areas.

Recreation management facilities are described in Recreation Management under Current Management Practices and Planning Guidance (cross-reference: Recreation Management, Part II).

TABLE PP-23

Land Treatments and Management Facilities on Public Lands

Project	Quantity[a]	Maintenance Responsibility	Condition
Seedings	49 projects, 57,000 acres	permittee 1,300 acres, BLM 55,700 acres	good, 7,000 acres fair, 33,000 acres poor, 17,000 acres
Fences	(200) projects, (275) miles	permittee	fair (most)
Pipelines	10 projects, 23 miles	BLM and permittee	fair
Springs	45 each	permittee	fair
Wells	40 each	permittee	good
Catchments	2 each	BLM	good
Reservoirs	(425) each	permittee	fair
Corrals	(60) each	permittee	fair
Trails	25 each, 60 miles	permittee, County, and BLM	good
Exclosures	20 each	BLM	fair
Communication Sites	6 each	BLM	good
Field Cabins	2 each	BLM	good
Hay/Horse Sheds	2 each	BLM	fair

NOTE: Recreation sites are discussed in Part II, Recreation Management.

[a] All numbers are rounded; those in parentheses are estimates.

Source: BLM project files.

ACCESS

LIST OF OVERLAYS

Transportation System (Access).

RESOURCE OVERVIEW

Access in the SJRA is well established. In August 1984 MOU UT-060-MA4-001 was signed between San Juan County and BLM. This MOU recognized the County's road rights under R.S. 2477, routes identified by the County as class B roads. The County's rights on these roads are exclusive and perpetual. The roads are under full control of the County, and only they have the right to regulate the uss. Any action by BLM on these roads must be approved by the County. The MOU established not only the roads and their location, but also the width. Most of these roads are 66 feet wide, but those roads considered major access routes (i.e., Montezuma Creek and Johnson Creek) are 100 feet wide. All of these roads are identified in case file U-53767, filed at the MDO.

The MOU also identified the County class D system. These are roads or trails that may or may not actually have been constructed, are not regularly maintained, or may be maintained only through vehicular travel (27-15-1, 27-15-2, 27-15-3, U.C.A., 1953). In short, they could be anything from a dirt road down to a vehicle trail. Any upgrading of these roads requires a right-of-way grant under the authority of Title V of FLPMA. The MOU also provided for a maintenance agreement between BLM and the County.

While the MOU is an effective management tool, it can be amended. For example, if one of the R.S. 2477 roads is incorrectly mapped, the legal description could be amended. If the County wishes to improve the road outside of the agreed-upon boundaries, a right-of-way under the authority of Title V of FLPMA would be required, and the original R.S. 2477 road would be relinquished. If a Class D road actually met the requirements of a R.S. 2477 road, it could be added to the R.S. 2477 system (43 CFR 2802.5(b)).
The requirements of R.S. 2477 roads are determined by state statute. Utah requires that the road be dedicated and mapped (27-12-26 U.C.A. 1953), or that the road be continuously used as a public thoroughfare for a period of 10 years (12-12-89 U.C.A., 1953).

DESCRIPTION OF ACCESS

The Access overlay shows four major road types as follows:

- Class B (R.S. 2477) roads, for the most part, are graveled, two-wheel drive roads maintained on a regular basis. However, some of the roads in the back country, such as Beef Basin, are not maintained regularly and are sometimes washed out. These are public roads that provide legal access and cannot be closed except by the County.

- Class D roads are, for the most part, four-wheel drive dirt trails or routes and are not maintained. These roads provide only physical access and could be closed upon concurrence by the County.
- Right-of-way access routes are available to the holder of a right-of-way for purposes other than roads (i.e., powerline, pipeline, telephone line). These routes provide access for maintenance and operation of the facility. These are primarily unimproved trails along the facility. Currently, the BLM has not allowed any exclusive use of this access, and the routes can be used by the public. However, they are not legal access for anyone except the right-of-way holder and can be closed, by BLM, to the public at large.
- Road rights-of-way are roads constructed by private individuals or companies under a right-of-way granted by BLM. These roads are maintained by the holder of the right-of-way and are primarily two-wheel drive (pickup) roads. These roads can be used by the public at large, but provide legal access only to the holder and are controlled by BLM.

Additional access routes on the overlay are Federal Government reservations of easements.

These routes are for the public at large but are controlled by the respective agency. However, some roads (i.e., Beef Basin and Dark Canyon) are jointly managed by the BLM and the County.

The County roads through and into the Manti-LaSal National Forest, GCNRA, and CNP are taken directly from the County's access map. These roads are shown only as means of access and clarity of access. There is no presumption on the part of BLM as to who controls or administers these access routes.

Other access facilities shown on the overlay are airports and helipads.

Recreational access to the San Juan River is under a BLM reservation at Sand Island near Bluff and at Mexcican Hat.

CADASTRAL SURVEY

LIST OF OVERLAYS

None.

RESOURCE OVERVIEW

Cadastral survey has been completed on approximately 75 percent of the resource area. Areas of very rough terrain, such as Dark Canyon, are not usually surveyed. However, the areas of high land use which require surveys are generally completed, and state sections (normally sections 2, 16, 32 and 36) are generally surveyed even in otherwise unsurveyed areas.

Individual surveys for specific projects, usually in already surveyed areas, are usually completed within three months of request and do not encumber management. For example, special surveys were needed for an exchange and a public sale in 1983. They were completed timely and did not cause a delay.

The Division of Operations of the MDO has a record of found corners; no MSA overlay has been made. Both the SJRA and MDO have the copies of original survey plats.

Cadastral survey is generally shown on USGS topography quadrangle maps. The USGS maps covering the SJRA contain some discrepancies regarding place names. This is especially true south of Dark Canyon where, according to local residents, all major mesas are mislabeled (i.e., all place names were inadvertently shifted one mesa west). For purposes of clarity, the San Juan RMP will use place names as given on the USGS topography maps.

AERIAL PHOTOGRAPHY

LIST OF OVERLAYS

Orthophoto Index

RESOURCE OVERVIEW

Complete coverage of the SJRA is provided on black and white aerial photography flown in 1975 and 1976, and on false color infrared photography flown in 1975. Both sets are available in the resource area in stereo pairs. Flight lines run north and south. The black and white photography is at a scale of 1:24,000 and is the base imagery for the orthophotoquads. The false color infrared is at a scale of 1:31,680.

On the Orthophoto Index overlay, both photo sets are indexed by orthophoto quad. In the case of the black and white, the effective area of the photo is the same as the orthophotoquad. For the false color infrared, the photo number given is for the flight line of photos in the area of the orthophotoquad.

The index numbers on the map (see table PP-24) are the numbers assigned by the BLM USO to their statewide index of orthophotoquads. Names of orthophotoquads can be expected to change.

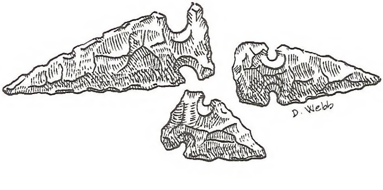
TABLE PP-24

Aerial Photography Index

State Index Number	Name	Black and White Photo Number	False Color Infrared Photo Number
47	Boundary Butte NW	GS-VDXU-1-171	MRIR-44-02
48	Mexican Hat NE	GS-VDXU-1-172	MRIR-42-02
49	Mexican Hat NW	GS-VDXU-1-230	MRIR-39-02
50	Goulding NE	GS-VEFL-6-64	MRIR-37-03
53	Monitor Butte	GS-VEFL-6-61	MRIR-31-02
54	No Mans Mesa NE	GS-VEFL-2-57	MRIR-29-02
55	Deep Canyon North	GS-VEFL-2-1	MRIR-27-02
56	Wilson Creek	GS-VEFL-2-112	MRIR-25-02
57	Navajo Mountain NW	GS-VEFL-2-56	MRIR-24-02
83	Wickiup Canyon	GS-VDXU-1-3	MRIR-55-02
84	Cajon Mesa SW	GS-VDXU-1-65	MRIR-52-02
85	Montezuma Creek SE	GS-VDXU-1-68	MRIR-50-01
86	Montezuma Creek SW	GS-VDXU-1-119	MRIR-48-02
87	Bluff SE	GS-VDXU-1-120	MRIR-46-02
88	Bluff SW	GS-VDXU-1-169	MRIR-44-04
89	Cedar Mesa SE	GS-VDXU-1-174	MRIR-42-05
90	Cedar Mesa SW	GS-VDXU-1-228	MRIR-39-05
91	Slickhorn Canyon	GS-VEFL-6-66	MRIR-37-03
92	Slickhorn Canyon West	GS-VEFL-6-63	MRIR-35-02
93	Whirlwind Draw	GS-VEFL-2-113	MRIR-33-02
94	Mikes Mesa	GS-VEFL-6-2	MRIR-31-03
95	Nokai Dome	GS-VEFL-2-59	MRIR-29-05
96	Alcove Canyon	GS-VEFL-2-3	MRIR-27-04
97	The Rincon	GS-VEFL-2-110	MRIR-25-06
98	Davis Gulch	GS-VEFL-2-54	MRIR-24-05
124	Ruinpoint	GS-VDXU-1-5	MRIR-55-04
125	Cajon Mesa NW	GS-VDXU-1-63	MRIR-52-03
126	Montezuma Creek NE	GS-VDXU-1-70	MRIR-51-03
127	Montezuma Creek NW	GS-VDXU-1-117	MRIR-48-04
128	Bluff NE	GS-VDXU-1-122	MRIR-46-05
129	Bluff NW	GS-VDXU-1-167	MRIR-44-06
130	Cedar Mesa NE	GS-VDXU-1-176	MRIR-42-08
248	Eastland SW	GS-VDXU-1-57	MRIR-52-15
249	Monticello SE	GS-VDXU-1-76	MRIR-50-18
250	Monticello SW	GS-VDXU-1-111	MRIR-48-17
251	Mt. Linnaeus SE	GS-VDXU-1-128	MRIR-46-19
252	Mt. Linnaeus SW	GS-VDXU-1-161	MRIR-44-24
253	Fable Valley SE	GS-VDXU-1-182	MRIR-42-21
254	Fable Valley SW	GS-VDXU-1-220	MRIR-39-21
255	Black Steer Canyon	GS-VEFL-6-73	MRIR-37-20
256	Indian Head Pass	GS-VEFL-6-55	MRIR-35-18
257	Copper Point	GS-VEFL-2-121	MRIR-33-19
258	Hite South	GS-VEFL-6-10	MRIR-31-17
288	Piute Knoll	GS-VDXU-1-13	MRIR-55-23
289	Eastland NW	GS-VDXU-1-55	MRIR-52-18
290	Monticello NE	GS-VDXU-1-78	MRIR-50-18
291	Monticello NW	GS-VDXU-1-109	MRIR-48-19
292	Mt. Linnaeus NE	GS-VDXU-2-4	MRIR-46-22
293	Mt. Linnaeus NW	GS-VDXU-1-159	MRIR-44-27
294	Fable Valley NE	GS-VDXU-1-184	MRIR-42-18
295	Fable Valley NW	GS-VDXU-1-218	MRIR-39-24
296	Bowdie Canyon East	GS-VEFL-6-75	MRIR-37-22
297	Bowdie Canyon West	GS-VEFL-6-53	MRIR-35-21
298	Sewing Machine	GS-VEFL-2-123	MRIR-33-20
299	Hite North	GS-VEFL-6-12	MRIR-31-20
329	Summit Point	GS-VDXU-1-15	MRIR-55-27
330	Lisbon Valley SW	GS-VDXU-1-53	MRIR-52-22
331	Hatch Rock SE	GS-VDXU-1-80	MRIR-50-20
332	Hatch Rock SW	GS-VDXU-1-107	MRIR-48-22
333	Harts Point SE	GS-VDXU-2-2	MRIR-46-20
334	Harts Point SW	GS-VDXU-1-157	MRIR-44-18
335	The Needles SE	GS-VDXU-1-186	MRIR-42-20
336	The Needles SW	GS-VDXU-1-216	MRIR-39-29
337	Teapot Rock	GS-VEFL-6-77	MRIR-37-29

131	Cedar Mesa NW	GS-VDXU-1-226	MRIR-40-09
132	Polly's Pasture	GS-VEFL-6-67	MRIR-37-08
133	Red House Springs	GS-VEFL-6-61	MRIR-35-05
134	Clay Hills	GS-VEFL-2-115	MRIR-33-06
135	Burnt Springs	GS-VEFL-6-4	MRIR-31-07
136	Halls Crossing NE	GS-VEFL-2-61	MRIR-29-09
137	Halls Crossing	GS-VEFL-2-5	MRIR-27-08
138	Waterpocket Fold	GS-VEFL-2-108	MRIR-25-08
165	Monument Canyon SE	GS-VOXU-1-7	MRIR-55-09
166	Monument Canyon SW	GS-VOXU-1-61	MRIR-52-07
167	Blanding SE	GS-VOXU-1-72	MRIR-50-12
168	Blanding SW	GS-VOXU-1-115	MRIR-48-10
169	Brushy Basin Wash SE	GS-VDXU-1-124	MRIR-46-10
170	Brushy Basin Wash SW	GS-VOXU-1-165	MRIR-44-17
171	Bears Ears SE	GS-VOXU-1-178	MRIR-42-12
172	Bears Ears SW	GS-VDXU-1-224	MRIR-39-12
173	Moss Back Butte	GS-VEFL-6-69	MRIR-37-12
174	Fry Spring	GS-VEFL-6-59	MRIR-35-10
175	Chocolate Drop	GS-VEFL-2-117	MRIR-33-11
176	Mancos Mesa	GS-VEFL-6-6	MRIR-31-10
177	Knowles Canyon	GS-VEFL-2-63	MRIR-29-11
178	Bullfrog	GS-VEFL-2-7	MRIR-27-11
206	Oak Creek Canyon	GS-VEFL-1-9	MRIR-55-12
207	Monument Canyon NW	GS-VOXU-1-59	MRIR-52-10
208	Blanding NE	GS-VDXU-1-74	MRIR-50-11
209	Blanding NW	GS-VOXU-1-113	MRIR-48-15
210	Brushy Basin Wash NE	GS-VDXU-1-126	MRIR-46-16
211	Brushy Basin Wash NW	GS-VOXU-1-163	MRIR-44-21
212	Bears Ears NE	GS-VOXU-1-180	MRIR-42-15
213	Bears Ears NW	GS-VDXU-1-222	MRIR-39-16
214	The Cheesebox	GS-VEFL-6-71	MRIR-37-17
215	Jacobs Chair	GS-VEFL-6-57	MRIR-35-15
216	Mancos Mesa NE	GS-VEFL-2-119	MRIR-33-15
217	Good Hope Bay	GS-VEFL-6-8	MRIR-31-15
218	Ticaboo Mesa	GS-VEFL-2-65	MRIR-29-15
247	Northdale	GS-VOXU-1-11	MRIR-55-17
370	Lisbon Gap	GS-VOXU-1-17	MRIR-55-30
371	Lisbon Valley NW	GS-VDXU-1-51	MRIR-52-22
372	Hatch Rock NE	GS-VDXU-1-82	MRIR-50-30
373	Hatch Rock NW	GS-VDXU-1-105	MRIR-48-24
374	Harts Point NE	GS-VOXU-1-134	MRIR-46-26
375	Harts Point NW	GS-VOXU-1-155	MRIR-44-26
376	The Needles NE	GS-VOXU-1-188	MRIR-42-24
377	The Needles NW	GS-VOXU-1-214	MRIR-39-22
415	Hatch Point SE	GS-VOXU-1-136	Mrir-46-30
416	Hatch Point SW	GS-VOXU-1-153	MRIR-44-34
417	Upheaval Dome SE	GS-VOXU-1-190	MRIR-42-26
456	Hatch Point NE	GS-VOXU-1-138	MRIR-46-36
457	Hatch Point NW	GS-VDXU-1-151	MRIR-44-32
458	Upheaval Dome NE	GS-VOXU-1-192	MRIR-42-39

PART II
RESOURCE MANAGEMENT PROGRAMS



4111 OIL AND GAS LEASING

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Current Oil and Gas Categories.

Known Geologic Structures and Oil and Gas Shows in Plugged and Abandoned Wells.

Oil and Gas Potential of Area.

MOU with Farmington Resource Area.

RESOURCE OVERVIEW

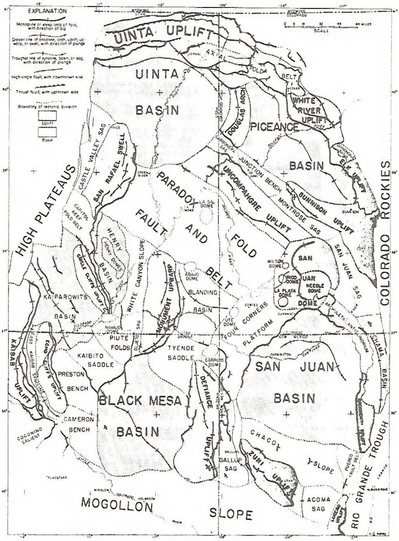
Geology Related to Oil and Gas Resources

The SJRA is geologically located on the southwestern margin of the Paradox Basin (cross-reference: Geology, Part I). This basin formed during the Pennsylvanian Period, 270 to 300 million years ago, when a combination of regional structural fabric, basinal tectonics, and sedimentation patterns formed a linear, ovate shaped evaporitic basin. The basin was 80 to 100 miles wide and extended roughly 300 miles from Durango, Colorado and Farmington, New Mexico on the southeast to Green River, Utah on the northwest.

The basin received up to 15,000 feet of Pennsylvanian (Hermosa Group) and Permian (Cutler Group) sediments. Evaporties (salt and anhydrite) and black shales were deposited in a cyclic manner in the central part of the basin, while carbonate deposition (limestone and dolomite) predominated on the margins of the basin, particularly on the southwestern flank. The clastic sediments (those derived by weathering, transport, and mechanical deposition by water) were derived from highlands to the northeast and east and the Uncompahgre and San Juan uplifts respectively. The evaporites and carbonates were chemically deposited and highly influenced by a cyclic fluctuation of rising and falling sea level due to worldwide glaciation during this time period (Peterson and Ohlen, 1963; Hite, 1975).

For the purpose of this discussion, the Paradox Basin can be subdivided into three tectonic subprovinces within the resource area, formed both during and after deposition of the basin. These subprovinces are the Paradox Fold and Fault Belt in the northern and northeastern sections, the Blanding Basin in the southern and southeastern sections, and the Monument Upwarp in the western section of the SJRA (see figure 4111-1).

The Paradox Fold and Fault Belt is characterized by northwest-southeast-trending, salt-cored anticlines formed by subsurface salt flowage in the


EXPLANATION
Monocline or steep limb of fold, with direction of dip
Crestal line of anticline, arch, uplift, upwarp, or swell, with direction of plunge
Troughal line of syncline, basin, or sag, with direction of plunge
High-angle fault, with downthrown side
Thrust fault, with upthrown side
Boundary of tectonic division
Uplift
Basin
0 8 16 32 48 64 MILES
SCALE
WYOMING
UTAH
COLORADO
UINTA UPLIFT
AXIAL
FOLD
BELT
UINTA
BASIN
WHITE RIVER UPLIFT
DOUGLAS ARCH
PICEANCE
BASIN
ELK UPLIFT
CASTLE VALLEY SAG
SAN RAFAEL SWELL
HIGH PLATEAUS
UNCOMPAHGRE UPLIFT
JUNCTION BENCH
GUNNISON UPLIFT
MONTROSE SAG
COLORADO ROCKIES
PARADOX
FAULT
AND
FOLD
BELT
LA SAL DOME
CAPITOL REEF FOLD BELT
HENRY BASIN
HENRY DOMES
CIRCLE CLIFFS UPLIFT
WHITE CANYON SLOPE
MONUMENT UPWARP
ABAJO DOME
BLANDING
BASIN
WILSON DOME
SAN
RICO DOME
JUAN
NEEDLE DOME
LA PLATA DOME
DOME
SAN JUAN SAG
ARCHULETA ANTICLINORIUM
KAIPAROWITS
BASIN
NAVAJO DOME
PIUTE FOLDS
UTE DOME
FOUR CORNERS
PLATFORM
KAIBAB UPLIFT
ECHO CLIFFS UPLIFT
KAIBITO SADDLE
TYENDE SADDLE
CARRIZO DOME
CHAMA BASIN
PRESTON BENCH
SAN JUAN
BASIN
BLACK MESA
BASIN
DEFIANCE UPLIFT
CAMERON BENCH
COCONINO SALIENT
CHACO
SLOPE
GALLUP SAG
ZUNI UPLIFT
PUERCO FAULT BELT
RIO GRANDE TROUGH
ACOMA SAG
LUCERO UPLIFT
FLAGSTAFF
WINSLOW
HOLBROOK
MOGOLLON
SLOPE

TECTONIC DIVISIONS OF THE COLORADO PLATEAU

Source: Kelley, 1975.

FIGURE 4111-1

Tectonic Divisions of the Colorado Plateau

Permian and Triassic time periods. Oil and gas resources in this subprovinceare found in reservoirs associated with the structural features coincident with the salt flowage. The northeastern boundary of the resource area overlaps and roughly parallels the southwestern margin of the fold and fault belt.

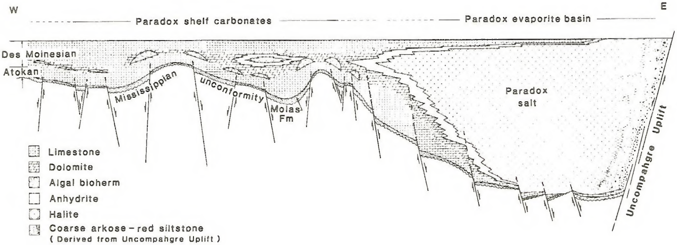
The Blanding Basin is a structurally low area that was dominated during the deposition of the Hermosa Group by the formation of carbonate-organic mounds (bioherms). These mounds formed along the shallow, gently sloping southern and southwestern margins of the Paradox Basin as a result of abundant marine life which flourished there in reef-like colonies. Through subsequent chemical and physical alteration, these mounds now form the most common type of reservoirs for petroleum found in the SJRA. Roughly the southeastern quarter of the resource area is situated in the Blanding Basin subprovince.

The Monument Upwarp forms a broad structural uplift occurring in the western half of the SJRA. This large north-south-trending anticline is noted for its steeply dipping eastern flank known as the Comb Ridge. The upwarp was a mildly positive area on the southwestern shelf of the Paradox Basin during deposition of the Hermosa Group, where it influenced depositional patterns (Baars, 1981). Strong uplift of the Monument Upwarp during the Laramide Orogeny in Late Cretaceous-Early Tertiary time later modified conditions related to oil and gas occurrence there.

The occurrence of petroleum in the SJRA appears to be dominated by two major geologic features, both associated with the structural and stratigraphic formation of the Paradox Basin. The first condition is associated with the deep basement structural fabric of the entire Colorado Plateau region. This northwest- and northeast-trending structural framework controlled the location of the Paradox Basin and greatly influenced sedimentation patterns within it. In addition, compressional wrench faulting along these deep flexures resulted in the juxtaposition of excellent reservoir rocks of Mississippian and Devonian age into positions adjacent to rich organic black shale source rocks of Pennsylvanian age. This relationship is shown in figure 4111-2.

The second geologic condition of major importance to oil and gas occurrence is associated with the depositional patterns of the Paradox Formation in the Blanding Basin and Monument Upwarp areas. Shoaling conditions along the shallow southwestern margin of the basin provided excellent conditions for the formation of bioherms. These thick, flat-bottomed, elongate mounds (composed of bioclastic debris, algal mounds, and colony-like structures of marine organisms) formed prolific oil and gas reservoirs as a result of (1) post-depositional alterations and (2) proximity to the black shale source rocks which cyclically covered them.

The following discussion will concentrate on these major geologic features and their effect on oil and gas occurrences in the SJRA. Other geologic conditions that have modified or influenced oil and gas occurrences to a lesser degree will also be discussed. This will serve as a basis for a more definitive analysis of oil and gas potential within the SJRA in areas currently removed from production.


W
E
Paradox shelf carbonates
Paradox evaporite basin
Des Moinesian
Atokan
Mississippian
unconformity
Molas Fm
Paradox salt
Uncompahgre Uplift
Limestone
Dolomite
Algal bioherm
Anhydrite
Halite
Coarse arkose – red siltstone
(Derived from Uncompahgre Uplift)

Algal bioherms are shown in general relationship to basement flexures.

Source: Baars and Stevenson, 1981.

FIGURE 4111-2

Schematic Cross-Section Across Paradox Basin During Middle Pennsylvanian Time, Showing Relationships of Shelf Carbonates to Evaporite Facies

Structural Characteristics and Tectonic Evolution

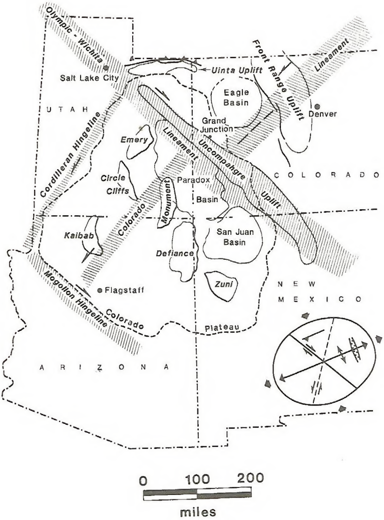
The primary geologic features affecting oil and gas occurrences in the SJRA are those involving the structural framework of the Paradox Basin and the surrounding Colorado Plateau as a region. Some of these structural patterns have been the result of far-reaching worldwide tectonic events; others were the resut of localized basin tectonics caused by rapid, deep sedimentation into a subsiding trough. These events and their effects will be discussed generally in the order in which they occurred.

Basement Framework. Many Paradox Basin investigators in the past few years have concluded that the structural fabric of the region was fixed by Late Precambrian time, and repeated rejuvenations of the basement structure have only modified the original framework. According to Baars and Stevensen (1981), the earliest known structural activity began sometime around 1.7 billion years ago, along two major rift systems that transect the Paradox Basin region (see figure 4111-3). One rift trends in a northwest direction and is believed to extend from Vancouver, B.C. southeast into Oklahoma. This rift has been called the Olympic-Wichita Lineament. The second rift trends in a northeast direction from the Grand Canyon area through the Colorado Mineral Belt to Lake Superior, and has been called the Colorado Lineament. These two continental scale rift systems bisect one another in the vicinity of Moab, Utah. All subsequent structural movements and tectonic events in the Paradox Basin in the past 600 million years reflect the influence and characteristics of these deep-seated rift and shear zones.

Fault Rejuvenations. Baars (1966) and Baars and See (1968) present conclusive evidence that structural uplift along the Olympic-Wichita Lineament in the Paradox Basin region occurred during the Cambrian, Devonian, and Mississippian times along the flexures shown in figure 4111-4. Although Early Paleozoic displacement on the faults was minor, sufficient vertical movement occurred to alter sedimentary facies on a local scale. During the Early Paleozoic era, the Paradox Basin region occupied a location on a shallow westward sloping marine platform of the Cordilleran Miogeosyncline with the craton (continent) to the east, and the ocean basin to the west.

The structural activity along this platform was responsible for isolating offshore sand bars in the Late Devonian McCracken Sandstone Member of the Elbert Formation, and provided high subaqueous fault blocks for the generation of crinoidal bioherms in the Mississippian Leadville Formation. These shallow water sandbars and bioherms were to become petroleum reservoirs at such fields as Lisbon Valley and Southeast Lisbon, both on the northern edge of SJRA, and Big Flat and Salt Wash in the Grand RA to the north.

Paradox Basin. After an extensive period of erosion on the Mississippian carbonate surface, resulting from regional platform uplift, the Paradox Basin began to form in response to structural sagging along the basement fault in the Early Pennsylvanian period. The deepest part of the basin formed adjacent to the Uncompahgre Uplift on the northeastern margin of the basin. Restricted water circulation in this deep trough section of the basin resulted in the cyclic deposition of thousands of feet of evaporites. As subsidence in the basin continued, the evaporite deposition rapidly filled the structural trough, burying the basement fault blocks by the end of the period (Baars and Stevenson, 1981).

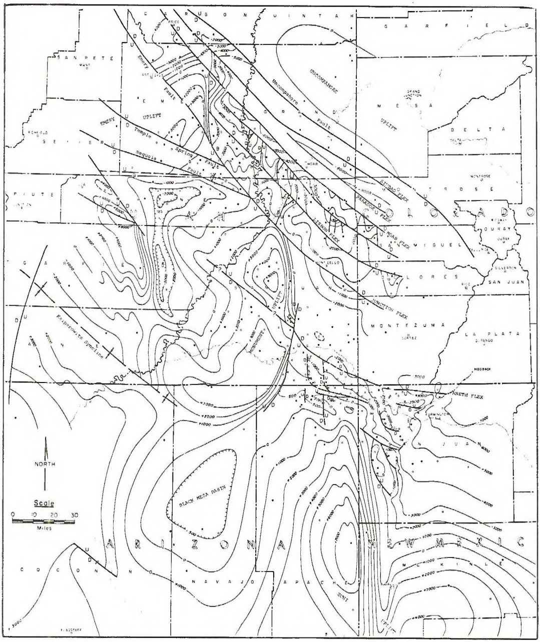

Olympic - Wichita
Salt Lake City
Uinta Uplift
Front Range Uplift
Lineament
Eagle Basin
Denver
UTAH
Grand Junction
Emery
Lineament
Uncompahgre
Uplift
Cordilleran Hingeline
Circle Cliffs
Paradox
Basin
COLORADO
Monument
Colorado
Kaibab
San Juan Basin
Defiance
Zuni
Flagstaff
NEW MEXICO
Mogollon Hingeline
Colorado
Plateau
ARIZONA
0
100
200
miles

Source: Baars and Stevensen, 1981.

FIGURE 4111-3

Basement Structural Lineaments of the Colorado Plateau Region

PARADOX BASIN


CARBON
UINTAH
GARFIELD
SAN PETE
EMERY
Emery Fault
UPLIFT
Temple Spring Fault
Uncompahgre Fault
UNCOMPAHGRE
UPLIFT
GRAND JUNCTION
MESA
DELTA
SEVIER
PIUTE
MONTROSE
SINBAD FLEX
PARADOX FLEX
MOAB FLEX
LISBON FLEX
COLORADO
OURAY
SAN MIGUEL
DOLORES
SILVERTON
SAN JUAN
JUNCTION FLEX
MONTEZUMA
CORTEZ
LA PLATA
DURANGO
KANE
Kaiparowits Syncline
MONUMENT
UPLIFT
ANETH FLEX
FARMINGTON
SAN JUAN
BLACK MESA BASIN
NORTH
Scale
0 10 20 30
Miles
ARIZONA
NEW MEXICO
COCONINO
NAVAJO
APACHE
McKINLEY
ZUNI
UPLIFT
FLAGSTAFF

Source: Szabo and Wengerd, 1975.

FIGURE 4111-4

Basement Flexures and Structure Contour Map of Mississippian Rocks in the Paradox Basin Area

At the same time as the evaporites were deposited in the deep basinal trough, carbonates and bioherms were forming on the shallow southern and southwestern margin of the basin in the Blanding Basin area. The deep, rapid subsidence of evaporites in the trough imparted a lateral transfer of compressive forces to the basin margins, which resulted in minor fault block uplift along basement flexures away from the trough (Szabo and Wengerd, 1975) (see figure 4111-2). As indicated in figure 4111-5, these major structural flexures line up with reservoirs in the Blanding Basin which produce from Pennsylvanian bioherm reservoirs. As subaqueous areas along the marine shelf were lifted closer to the surface, more sunlight reached the bottoms, sediments were trapped, and bioherm buildups could occur.

Salt Anticlines. The next structural phase of the Paradox Basin occurred during the Late Pennsylvanian to Permian time when the Uncompahgre Uplift on the northeastern margin of the basin began a rapid period of uplift. Erosion of this highland resulted in deposition of a massive wedge of clastic materials which were shed southwestward off the Uncompahgre onto the evaporites and shales in the deep northeast trough of the basin. Up to 15,000 feet of clastics, the Cutler Group, were deposited onto an estimated 5,000 to 8,000 feet of evaporites (Szabo and Wengerd, 1975). The weight of this great thickness of sediments on the salts below resulted in lateral subsurface salt flowage to the southwest, away from the region of extreme pressure.

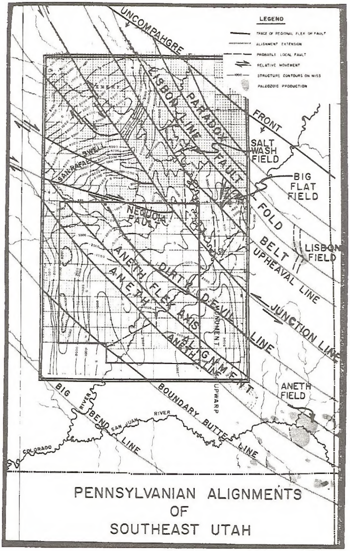
As the salt beds were squeezed to the southwest, they encountered the fault scarps of the northwest-trending basement flexures they had previously buried. Where it encountered these subsurface butresses, the salt was forced upward into the overlying strata. This action resulted in the formation of the northwest-trending salt anticlines seen at the surface today (see figure 4111-6). In areas on the salt flowage side of the fault scarps, the salt reached thicknesses of up to 15,000 feet. The black shales of the Paradox Formation, cyclically deposited within the salt, also moved with the flowage. Consequently, these source rocks were juxtaposed adjacent to the favorable reservoir rocks of Devonian and Mississippian age. This combination of events resulted in the commercial accumulation of oil and gas at the Lisbon Valley field in SJRA and at the Big Indian, Big Flat, and Salt Wash fields in Grand RA. This situation is diagrammed in figure 4111-7 in a schematic from Baars and Stevensen (1981).

Salt flowage was rapid in the Late Pennsylvanian and Early Permian time, but slowed considerably in Triassic time. By the close of the Jurassic period, the available salt had been depleted to the point where it could no longer flow, and the growth of the salt anticlines died a natural death. The result of this massive salt flowage was the formation of the Paradox Fold and Fault Belt.

Laramide Orogeny. Growth of the major structures in the vicinity of the Paradox Basin was mostly complete by the end of the Permian period. The sediments shed off the Uncompahgre Uplift covered and buried the Paradox Basin. All was relatively quiet, with the exception of adjustments in the salt anticlines, for a long period of time.

PARADOX BASIN

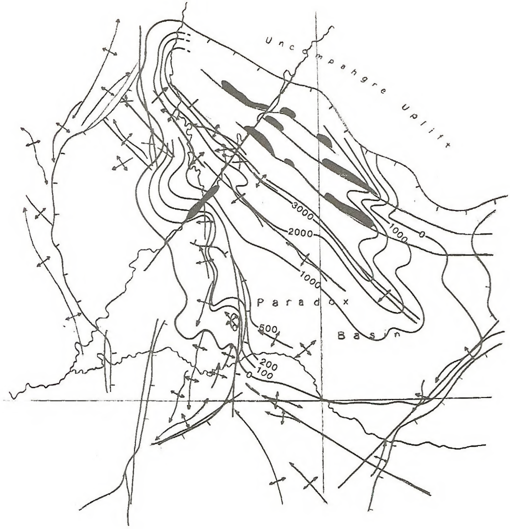
Major Pennsylvanian oil and gas production to date has been limited to the area between the Dirty Devil alignment on the northeast and the Boundary Butte alignment on the southwest; major pre-Paradox production to date has been limited to trends adjacent to the Lisbon and Upheaval alignments.


LEGEND
TRACE OF REGIONAL FLEX OR FAULT
ALIGNMENT EXTENSION
PROBABLE LOCAL FAULT
RELATIVE MOVEMENT
STRUCTURE CONTOURS ON MISS
PALEOZOIC PRODUCTION
UNCOMPAHGRE
FRONT
LISBON LINE
PARADOX FAULT
FOLD
BELT
SALT WASH FIELD
BIG FLAT FIELD
LISBON FIELD
UPHEAVAL LINE
JUNCTION LINE
SAN RAFAEL SWELL
NEQUOIA FAULT
DIRTY DEVIL LINE
ANETH FLEX AXIS
ANETH
ALIGNMENT
ANETH LINE
MONUMENT UPWARP
ANETH FIELD
BIG BEND LINE
BOUNDARY BUTTE LINE
COLORADO
RIVER
SAN JUAN
RIVER
PENNSYLVANIAN ALIGNMENTS OF SOUTHEAST UTAH

Source: Szabo and Wengerd, 1975.

FIGURE 4111-5

Pennsylvanian Alignments of Southeast Utah

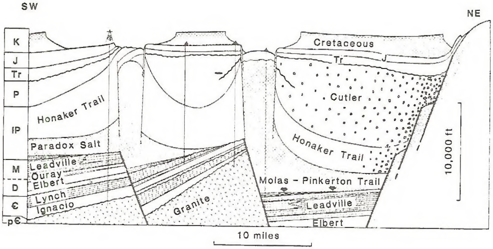

Uncompahgre Uplift
3000
2000
1000
1000
0
Paradox
Basin
500
200
100
0

Basin outline is defined by distal limit of Paradox salt. Contours are net salt isoliths of the Paradox Formation. Major anticlines and monoclines are shown. Salt anticlines shown in gray with related northwest-trending basement faults.

Source: Baars and Stevenson, 1981.

FIGURE 4111-6

Salt Anticlines and Salt Thickness in the Paradox Basin


SW
NE
K
J
Tr
P
IP
M
D
€
p€
Cretaceous
Tr
J
Cutler
Honaker Trail
Honaker Trail
Paradox Salt
Leadville
Ouray
Elbert
Lynch
Ignacio
Granite
Molas - Pinkerton Trail
Leadville
Elbert
10,000 ft
10 miles

Source: Baars and Stevenson, 1981.

FIGURE 4111-7

Salt Flowage Cross-Section in the Paradox Basin, Showing Pre-Salt Faults and Salt Anticlines

In Late Cretaceous to Early Tertiary time, one final major adjustment was made to the structural framework of the Paradox Basin. This adjustment was a result of compressional tectonism that reshaped the western North American continent. The fact that its effects were not as drastic in the Paradox Basin region may have been due to the deep crustal lineaments that resisted and deflected the lateral compressional forces which buckled up entire mountain ranges surrounding the Colorado Plateau region (Baars and Stevenson, 1981).

This wave of crustal compression has been labeled the Laramide Orogeny. The primary effects of the Laramide on the Paradox Basin region were the enhancement of pre-existing structures, principally the Monument Upwarp, and the overturning of large drape-folds toward the east. These compressional forces changed minor, low-amplitude folds into structures of major significance. The salt anticline structures of the Paradox Fold and Fault Belt show little or no effects from the Laramide disturbance; perhaps the salt enclosing the structures absorbed the forces internally.

Recent Structural Adjustment. Tectonic events following the Laramide disturbance have had more effect on basin geomorphology than has anything else. Shortly after the Laramide, the entire Colorado Plateau province was gently, but bodily, uplifted and tilted toward the north by forces from the south. As a result, the Paradox Basin region was subjected to deep erosion. Roughly 24 to 48 million years ago, the LaSal and Abajo Mountains intruded into the Paradox Basin region, probably along intersections of northwest- and northeast-trending basement lineaments (Witkind, 1975).

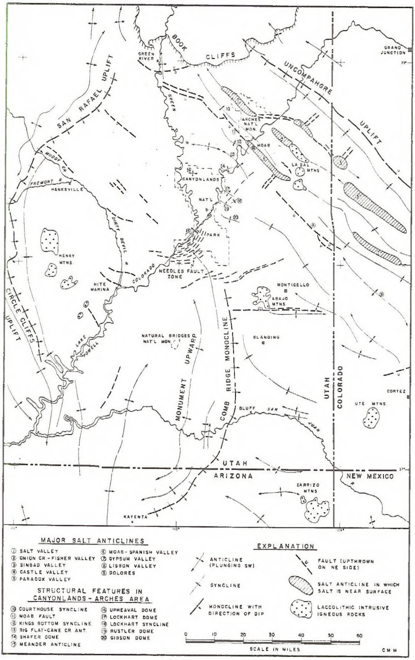
Late in the episode of regional tilting and during the intrusion of the younger laccoliths, general elevation of the Colorado Plateau region occurred. Ground water began to remove near-surface salt by solution on the larger salt anticlines; consequently, solution collapse occurred along the anticlinal crests. As the region uplifted, deep incision by the Colorado and San Juan Rivers exposed upper Pennsylvanian evaporites and carbonate mounds in the San Juan and Cataract Canyons as they cut across and around the Monument Upwarp. The structural surface features of the Paradox Basin region as they appear today are shown in figure 4111-8.

Stratigraphic and Sedimentation Patterns

The second major geologic feature affecting oil and gas occurrences in the SJRA is associated with the sedimentation patterns exhibitied by the Paradox Formation during its deposition into the Paradox Basin during the Middle Pennsylvanian time period.

These sedimentation patterns and their resulting stratigraphic relationships were influenced primarily by the geometry of the Paradox Basin, which was established by the structural framework of the entire region, as previously discussed.

Pre-Pennsylvanian Sedimentation. The only sedimentation of importance to oil and gas resources prior to the deposition into the Paradox Basin concerns Early Paleozoic deposition of marine carbonates and shallow water sandbars during the Devonian and Mississippian time periods of the Paleozoic.


BOOK CLIFFS
GREEN RIVER
GRAND JUNCTION
UNCOMPAHGRE UPLIFT
SAN RAFAEL UPLIFT
GREEN
ARCHES NAT'L MON.
MOAB
LA SAL MTNS
CANYONLANDS NAT'L PARK
MUDDY CR
FREMONT R
HANKSVILLE
DIRTY DEVIL R
HENRY MTNS
HITE MARINA
COLORADO
NEEDLES FAULT ZONE
MONTICELLO
ABAJO MTNS
CIRCLE CLIFFS UPLIFT
LAKE POWELL
NATURAL BRIDGES NAT'L MON.
MONUMENT UPWARP
COMB RIDGE MONOCLINE
BLANDING
UTAH
COLORADO
CORTEZ
UTE MTNS
BLUFF
SAN JUAN
UTAH
ARIZONA
NEW MEXICO
CARRIZO MTNS
KAYENTA
MAJOR SALT ANTICLINES
① SALT VALLEY
② ONION CR.-FISHER VALLEY
③ SINBAD VALLEY
④ CASTLE VALLEY
⑤ PARADOX VALLEY
⑥ MOAB-SPANISH VALLEY
⑦ GYPSUM VALLEY
⑧ LISBON VALLEY
⑨ DOLORES
STRUCTURAL FEATURES IN CANYONLANDS-ARCHES AREA
⑩ COURTHOUSE SYNCLINE
⑪ MOAB FAULT
⑫ KINGS BOTTOM SYNCLINE
⑬ BIG FLAT-CANE CR ANT.
⑭ SHAFER DOME
⑮ MEANDER ANTICLINE
⑯ UPHEAVAL DOME
⑰ LOCKHART DOME
⑱ LOCKHART SYNCLINE
⑲ RUSTLER DOME
⑳ GIBSON DOME
EXPLANATION
ANTICLINE (PLUNGING SW)
SYNCLINE
MONOCLINE WITH DIRECTION OF DIP
FAULT (UPTHROWN ON NE SIDE)
SALT ANTICLINE IN WHICH SALT IS NEAR SURFACE
LACCOLITHIC INTRUSIVE IGNEOUS ROCKS
0 10 20 30 40 50 60
SCALE IN MILES
CMM

TECTONIC MAP OF SE UTAH
(AND ADJOINING PARTS OF ARIZONA & COLORADO)

Source: Baars and Molenaar, 1971.

FIGURE 4111-8

Surface Structural Features of Paradox Basin as They Appear Today

Formations of this time period were deposited on a relatively stable continental shelf that lay to the east of the Cordilleran Miogeosyncline. Occasional eastward transgressions of the sea onto the continent resulted in the deposition of blanket sands and normal marine carbonates. High-angle normal faulting along the continental margin in the region of the future Paradox Basin resulted in shoaling conditions and bioherm development in carbonate mounds, as discussed earlier.

Pennsylvanian Sedimentation. Sedimentation patterns and tectonic activity were relatively constant in the Paradox region for approximately 300 million years, up until the Pennsylvanian period. The Paradox Basin area began to subside along deep basement structures during the early Pennsylvanian time, when it was surrounded by low-lying land areas and shallow seas. The resulting sedimentation into the basin consisted of thousands of feet of evaporites (halite, anhydrite, sylvite), carbonates (limestones and dolomites) and black shales, collectively referred to as the Hermosa Group.

The Hermosa Group is composed of the Pinkerton Trail, Paradox, and Honaker Trail Formations, in ascending order (see figure 4111-9). The Pinkerton Trail Formation disconformably overlies the Mississippian age rocks. This formation consists of normal to restricted marine deposits consisting of siltstone, shale, limestone, dolomite, and anhydrite. It was the last formation deposited on the relatively stable continental shelf before major subsidence and evaporite deposition began in the Paradox Basin.

The Paradox Formation is the middle member of the Hermosa Group, and the major oil and gas producing formation in the Paradox Basin. The formation is composed of thousands of feet of evaporites and black shales in the deep sections of the basin, which grade laterally into shelf carbonates on the basin margins.

Sedimentation into the now rapidly subsiding basin resulted in a complex series of vertical and lateral sedimentary relationships, principally controlled by basin geometry. The major factor controlling basin geometry was the deep basement flexures of the Colorado Lineament. Depositional subsidence along these flexures formed two distinct types of rock assembledges, called facies, as depicted in figure 4111-2.

An evaporitic facies was formed in the deep subsiding trough on the northeast side of the flexures, consisting of halite, anhydrite, dolomite, and black shales. Water in this portion of the basin was deep, quiet, and salty, with a notable lack of marine life. Thousands of feet of salt were deposited in a sequence, dependent on salt concentration in the trough.

Shallow marine shelf conditions prevailed on the southwest side of this flexure, resulting in deposition of a carbonate facies consisting of limestones, dolomites, bioherm mounds, and black shale. Circulation on the marine shelf prevented widespread deposition of evaporites. However, during cycles of low water level and high salt concentrations, thin salt beds formed on the basinward margins of the shelf.

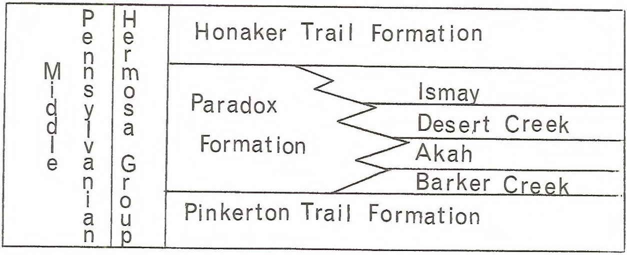

Middle
Pennsylvanian
Hermosa Group
Honaker Trail Formation
Paradox Formation
Ismay
Desert Creek
Akah
Barker Creek
Pinkerton Trail Formation

FIGURE 4111-9

Stratigraphic Section of Hermosa Group

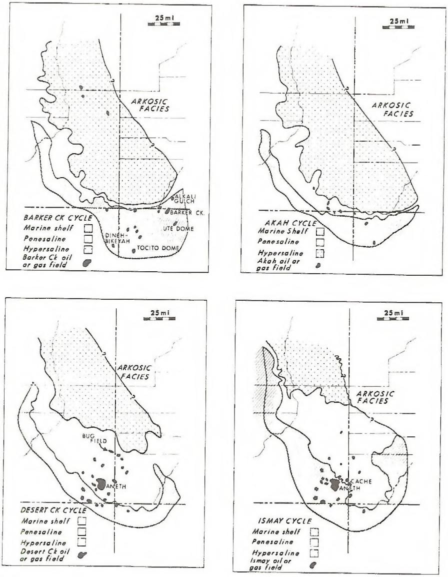
The two facies grade laterally into each other across the deep basement flexure zone, where down-faulting into the rapidly subsiding trough occurred in stair-step fashion. Reid and Berghorn (1981) referred to this zone of intertonguing between the evaporite and carbonate facies as the penesaline facies. This slope-type facies exhibits characteristics of both adjacent major facies. The thickest and most areally extensive bioherm buildups in the Desert Creek and Ismay cycles are close to the boundary between the carbonate facies and the penesaline facies. Apparently the algal colonies acted as traps for sediment and debris, which was eroded and swept basinward from the marine shelf to the deep trough. Also, local uplift along block faults in the flexure zone may have created shoaling conditions.

In addition to these complex lateral facies relationships, global glaciation during the Middle Pennsylvanian (Hite and Buckner, 1981) caused worldwide cyclic fluctuations in sea level, which greatly influenced vertical sedimentary patterns in the basin. The marine accessways to the Paradox Basin appear to have been broad shelves, rather than narrow channels, located on the southern and perhaps the northwestern margins of the basin. Consequently, a worldwide sea level change of only a few feet would be sufficient to cause significant changes in evaporite sedimentation in the basin.
According to Hite (1970), black shales were deposited during the highest stand of sea level when inflow of organic and detrital material into the basin was at a maximum, and salinity was at a minimum. As sea level dropped and inflow decreased, salinity increased, resulting in the deposition of anhydrite, followed by salt (halite), and potash salts if the brines became highly concentrated (cross-reference: Mineral Leasing, Part II). As sea level rose again, some of the last deposited salt dissolved, producing a disconformity. As water in the basin began to freshen, anyhdrite and then siltly dolomite were deposited, followed by black shale when the sea level was again at a maximum level.

According to studies by Hite and Buckner (1981) one major cycle in the Ismay lasted 110,000 years. The total number of cycles deposited in the basin is difficult to measure, because local depositional features altered the sequence in areas, particularly around the shallow margins which were exposed to erosion during low sea level. Various authors have placed the number of discernable cycles at between 29 and 40. The total original thickness of the cyclic evaporite facies is estimated to have been 5,000 to 7,000 feet in the deeper parts of the basin, thinning rapidly on the shelf margins.

Based on detailed basinwide correlations of black shale marker beds, the Paradox Formation has been divided into four major cycles of importance to oil and gas occurrences. These cycles (in ascending order, the Barker Creek, Akah, Desert Creek, and Ismay Zones) and their lateral facies relationships are shown in figure 4111-10.

The Barker Creek Zone consists of a narrow penesaline facies separating widespread marine shelf (carbonate) facies from hypersaline (evaporite) facies. The evaporitic facies of the Barker Creek Zone extended far onto the marine shelf. Production in this zone occurs in both the carbonate and evaporite facies and is associated with structural anomalies. Both carbonate


25 mi
ARKOSIC FACIES
ALKALI GULCH
BARKER CK.
UTE DOME
DINEH-BIKEYAH
TOCITO DOME
BARKER CK CYCLE
Marine shelf
Penesaline
Hypersaline
Barker Ck oil or gas field
25 mi
ARKOSIC FACIES
AKAH CYCLE
Marine Shelf
Penesaline
Hypersaline
Akah oil or gas field
25 mi
ARKOSIC FACIES
BUG FIELD
ANETH
DESERT CK CYCLE
Marine shelf
Penesaline
Hypersaline
Desert Ck oil or gas field
25 mi
ARKOSIC FACIES
CACHE
ANETH
ISMAY CYCLE
Marine shelf
Penesaline
Hypersaline
Ismay oil or gas field

Source: Reid and Berghorn, 1981.

FIGURE 4111-10

Lateral Extent of Major Depositional Cycles in the Paradox Formation
(also showing locations of oil and gas fields)

and algal mounds are productive in the carbonate shelf facies of the Barker Creek. Production in the evaporite facies of the Barker Creek occurs from structural traps in fractured sections of thin dolomites and shales, probably related to salt flowage in the Paradox Fold and Fault Belt.

Facies distribution for the Akah Zone is similar to that of the Barker Creek Zone. The zones differ in that most oil and gas production from the Akah is in the penesaline facies, with only a minor part of the production occurring in the marine shelf/carbonate facies. All production is coincident with multipay structural anomalies, which are probably associated with upward movements along the deep basement fault zone after deposition of the Akah.

In the Desert Creek Zone, the marine shelf/carbonate and penesaline facies cover the majority of the basin, probably as a result of high sea level during this cycle. The zone contains the largest accumulations of oil and gas found in the Paradox Basin. Most production is from algal mounds in the penesaline facies, as typified by the large Aneth Field, which as produced some 350 million barrels of oil since its discovery in 1956. According to Petersen and Ohlen (1963), this particular algal mound structure covers an area of more than 100 square miles and is locally as much as 150 feet thick. Other Desert Creek mounds have been found basinward of Aneth; however, in all cases they have proven to be much more areally restricted. In addition, as a result of the high Desert Creek sea levels, the thickest and most areally extensive black shale zones found in the basin occur in this zone. This is important when looking for potential source rocks and, in combination with the large algal mound buildup, helps explain the prolific production from the Desert Creek Zone.

Most productive fields in the Ismay Zone occur in the marine shelf/carbonate facies. There is a large area of the penesaline facies where productive potential exists. The Ismay Zone contains the second largest accumulations of oil and gas fields in the Paradox Basin. Most production from the Ismay Zone occurs in algal and carbonate mounds. Although Ismay mounds are not known to reach the size of those in the Desert Creek, they nevertheless have a broader regional distribution. In the Ismay field, separate but overlapping mounds have been stacked on top of each other. Collectively, these mounds cover an area of about 12 square miles. Buildups are generally elongate in a northwest direction, are flat-bottomed, and can be several thousand feet wide, at least 10,000 feet long, and up to 40 feet thick.

The Honaker Trail Formation is the upper member of the Hermosa Group and directly overlies the Paradox Formation. Deposition of carbonate limestones all across the Paradox Basin signaled an end to the cyclic, evaporitic deposition in the Paradox Basin. Fresh marine waters entered and soon filled the basin. This was the last marine deposition in the Paradox Basin prior to the filling of the basin with coarse clastic materials shed from the rapidly uprising Uncompahgre Uplift during the following Permian Period.

Post-Pennsylvanian Sedimentation. Subsequent deposition in the Paradox Basin region during the Triassic and Jurassic time periods consisted principally of continental sedimentation with little significance to the occurrence of oil and gas resources. Some basinal deposition occurred across the region during the Cretaceous time period, followed by intermontaine lake deposition in the

Tertiary time period. This later sedimentation may have contained characteristics favorable for oil and gas generation and trapping, as it does in the Unita Basin on the northern boundary of the Paradox Basin; however, deep erosion of the entire Colorado Plateau region during the past 10 million years has removed all Cretaceous and Tertiary strata from the SJRA section of the Paradox Basin.

Summary

All oil and gas occurrences in the SJRA and probable potential for discovering additional oil and gas resources are associated with (1) deposition of the Paradox Basin during the Pennsylvanian time period and (2) the preceding and subsequent structural adjustments and tectonic evolution of the region.

History of Exploration in the Paradox Basin

Petroleum interest in the SJRA and the Four Corners region in general began in 1879, when E.L. Goodridge observed oil seeping from a canyon wall along the San Juan River near Mexican Hat. The first commercial production occurred in 1908 with the completion of the No. 1 Crossing Well at 225 feet in the Mexican Hat field.

Limited exploration occurred over the next 30 years and consisted principally of shallow drilling on observed surface structures with little success. The next commercial discovery in the Paradox Basin occurred on the Navajo Indian reservation in 1948, after important technical advancement of geophysical techniques in the early 1940s. The discovery of the Boundary Butte field in 1948 led to a flurry of exploration activity, but success was again limited by a lack of understanding of the complex stratigraphic relations of the bioherm reservoirs in the basin.

Exploration boomed in the late 1950s with the discovery of the huge Aneth field by the Texas Company in 1956, when their No. 2 Navajo well came in with an initial potential of 1,704 barrels of oil per day from the Desert Creek zone of the Paradox Formation.

Seventeen fields were discovered in the late 1950s and early 1960s, on lands administered today by the SJRA. Table 4111-1 lists the discovery dates of known fields within the resource area. Although exploration continued in the late 1960s, discovery success declined. Stable oil prices, combined with decreasing discovery success, resulted in a decline in exploration until the Middle East oil embargo in 1973. As a result of the embargo, exploration again picked up, resulting in one new discovery in 1977 and several in the early 1980s.

Exploration and development have been heavy since 1979. In FY 1979, the resource area handled 23 APDs for oil and gas. Since then there has been a significant increase: 62 in 1980; 100 in 1981; 56 in 1982; 91 in 1983; and 70 in 1984.

TABLE 4111-1

Oil and Gas Fields and Production Statistics

Known Geologic Structures San Juan Resource Area	Other Published Field Names	Approx. Location	Discovery Date	Acreage	Status (3/1/85)	1983 Production		Cumulative Production (as of 12/83)		Remarks
						Oil (barrels)	Gas (MCF)	Oil (barrels)	Gas (MCF)	
Alkali Canyon		T37S,R23-24E	1965	6,791	Producing	0	0	3,919	40,085	Field back on production 3/84
Aneth	Includes Bluff Field	T39-42S, R23-25E	1956	69,576	Producing	6,047,148	5,310,813	325,587,105	308,761,044	
Black Steer Canyon		T39S,R25E	1984	160	Producing	N/A	N/A	29,289	39,100	Cumulative Production figures as of 1/85, since field discovery
Bluff Bench I		T40S,R22E	1957	40	Abandoned	0	0			
Bluff Bench II		T40S,R22E	1957	40	Abandoned	0	0	16,436	7,526	Combined cumulative production
Bluff Bench III		T40S,R21E	1959	40	Abandoned	0	0			
Bradford Canyon		T37S,R24E	1983	1,920	Producing	3,634	17,078	15,015	57,056	
Broken Hills		T40S,R22E	1959	7,923	Producing	2,039	656	104,437	55,968	

Bug		T35-36S,R26E	1983	3,542	Producing	192,768	333,602	959,595	1,581,423	
Cave Canyon		T37-38S,R24E	1984	925	Producing	N/A	N/A	9,247	18,135	Cumulative production figures as of 1/85, since field discovery
Cowboy		T39S,R22E	1968	840	Producing	5,769	0	147,522	108	
Grayson		T38S,R22E	1961	40	Abandoned	0	0	6,441	5,331	
Horsehead Point		T36S,R25E	1984	2,490	Shut-In	N/A	N/A	0	3,500	Cumulative production figures as of 1/85, since field discovery
Mexican Hat		T42S,R19E	1908	2,640	Producing	6,664	0	56,948	316	
Mustang		T36S,R33E	1983	1,760	Producing	829	20,690	50,425	291,115	
North Lisbon	Lisbon	T29-30S,R24E	1960	8,639	Producing	629,493	20,117,430	44,656,584	409,128,511	
Patterson Canyon	Little Nancy	T37-38S,R25E	1981	9,565	Producing	42,928	193,550	87,915	424,595	
Recapture Creek		T40S,R23E	1956	1,640	Producing	49,391	154,398	1,842,582	2,665,060	
Squaw Canyon	Tin Cup Mesa	T38S,R25-26E	1980	4,800	Producing	32,201	92,918	196,262	406,583	
Turner Bluff I		T40S,R22-23E	1957	1,988	Producing	28,070	11,440	524,713	535,593	
Turner Bluff III		T40S,R22-23E	1963	360	Producing	18,496	14,230	93,039	44,578	
Unnamed	Little Valley	T30S,R25E	1961	1,000	Producing	9,309	1,029,204	90,806	9,300,921	
Unnamed		T30-31S,R24E	1981	372	Shut-In	0	0	522	0	One Well oil field IP 12 BOPD

TABLE 4111-1 (Concluded)

Known Geologic Structures San Juan Resource Area	Other Published Field Names	Approx. Location	Discovery Date	Acreage	Status (3/1/85)	1983 Production		Cumulative Production (as of 12/83)		Remarks
						Oil (barrels)	Gas (MCF)	Oil (barrels)	Gas (MCF)	
Unnamed		T35S,R22E	1983	640	Abandoned	0	0	425	0	One well oil field IP 6 BOPD
Unnamed	Hatch	T38S,R24E	1957	360	Abandoned	0	0	15,446	40,891	
Unnamed	Black Mesa	T39S,R21E	1962	40	Abandoned	0	0	2,640	0	
Unnamed		T39S,R25E	1981	1,440	Shut-In	0	0	0	0	Gas field never produced IP 4.7 MMCFPD

NOTE: MCF = 1,000 cubic feet; IP = initial production; BOPD = barrels of oil per day; MMCFGPD = million cubic feet of gas per day.

Sources: DOGM, 1984; Riggs, 1978; and internal BLM oil and gas records.

Geophysical activity is measured in miles of seismic line. In 1980 and 1981 activities covered approximately 1,000 miles each year, with 1,400 miles each year in 1982, 1983, and 1984. This is an average of over 1,200 miles per year for the past 5 years. Most of this activity has been concentrated in the southeast portion of the resource area.

Recent exploration activity has been successful, with the discovery of two new fields in 1980, three in 1981, one in 1982, four in 1983, and three in 1984. Recent drilling success could also add two to three new fields in 1985, depending on the results of current testing.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

Laws that govern managment of oil and gas resources include the following:

- the Act of February 25, 1920 (the Mineral Leasing Act), as amended and supplemented;

- the Mineral Leasing Act for Acquired Lands of 1947, as amended;

- FLPMA of 1976;

- the Combined Hydrocarbon Leasing Act of 1981; and

- the Federal Oil and Gas Royalty Management Act of 1982.

Federal regulations that govern management of oil and gas resources are found in:

- 43 CFR 3045 - Geophysical Exploration
- 43 CFR 3100 - Oil and Gas Leasing
- 43 CFR 3140 - Combined Hydrocarbon Leasing
- 43 CFR 3160 - Onshore Oil and Gas Operations

The Bureau has also issued several manual releases in the 3100 series for general guidance in handling technical and administrative situations. Mandates for managing oil and gas resources are also clearly issued by the President and the BLM Director in their National Minerals Management Policy Statement of May 29, 1984 (see Appendix 4111-A at the end of this chapter).

Bureau guidance can be found in several IMs.

IM 84-254, change 2 gives the IBLA requirement that, for a no lease category (category 4), the record must show that consideration was given to leasing under a less restrictive category, including the no surface occupancy stipulation, and that the stipulations were determined to be inadequate to protect the public interest.

IM 84-415 reduces the use of stipulations where protection of surface resources, values, uses, or users is already afforded by the standard lease terms, regulations, or formal operational orders.

The primary purpose of attaching environmental stipulations to leases is to modify, for environmental protection, the basic right that would otherwise be granted under the standard oil and gas lease. Under the standard lease the Bureau can generally modify, but not deny, proposed operations to mitigate adverse environmental impacts.

Stipulations should be used only when they are both necessary and justifiable. If a lessee is to be prevented from extracting oil and gas, and if the prohibition is not mandated by a specific, nondiscretionary statute, then stipulations are necessary. A stipulation is justifiable if there are resources, values, uses, or users present that cannot coexist with oil and gas operations, cannot be adequately managed or accommodated on other lands for the duration of oil and gas operations, and would provide a greater benefit to the public than would oil and gas operations.

RESOURCE ALLOCATIONS

Allocations for oil and gas resources are determined at three stages. The first stage involves determining what public lands should be leased. This determination is made through the RMP and comes from a detailed analysis of all resources available at a given location and conflicts among the various resources.

Four leasing categories were established by the BLM in Utah in 1975, to determine what areas would be leased and under what conditions. Lands placed into category 1 are open to leasing with standard lease stipulations; category 2 lands are open to leasing with special stipulations to mitigate potential impacts to other resources from exploration and development of the lease; category 3 lands are open to leasing, but have a no surface occupancy stipulation, meaning that any development must be done without surface disturbance, usually by directional drilling from offlease areas; and category 4 lands are closed to leasing due to Congressional or administrative withdrawal to protect nationally significant resource values on the surface.

Existing categories will be re-evaluated under the RMP to see if all concerns and conflicts are still valid. Guidance for determining oil and gas leasing categories is addressed specifically in IMs 84-254, 84-415, and 85-260. Further planning guidance to the field is established in IMs UT-82-259 and UT-83-70. The BLM is in the process of changing the four-category system to a three-category system. This system has not yet (July 1985) been finalized, but generally category 1 areas would be open to lease, category 2 areas would be open with stipulations, including the no surface occupancy stipulation, and category 3 areas would be closed to oil and gas leasing. The San Juan RMP will use the new system.

Both WO and USO planning guidelines indicate that the only lands to be closed to leasing are lands designated by (1) legislation or regulation; (2) formal (or proposed) withdrawal; (3) formal Departmental policy; or (4) commitments made to the public in planning or other formal documents that have yet to be revised to reflect this policy.

Once it is determined where to lease and what types of mitigating stipulations (if any) should apply to the lease, the second stage of resource allocation involves actual leasing.

Actual leasing is by three means: noncompetitive, lottery, and competitive, determined by an area's location in relation to past lease status and KGSs.

A KGS is a trap in which an accumulation of oil or gas has been discovered by drilling and determined to be productive; the limits of the KGS include all acreage that is presumptively productive.

This second stage allocates rights to explore for and produce oil and gas from the lease to individuals and corporations who acquire the leases. Lessees pay rent annually to the Federal Government, based on acreage in the lease. Half of the money collected from lease rental is returned to the state in which the lease is situated. Leasing and determination of a KGS are done at the USO level and do not involve the planning process.

The third stage of resource allocation occurs at the production stage. The lease owner is required to pay royalty on all produced oil and gas, 12.5 percent for oil and 12.5 to 25 percent for gas. Again, 50 percent of all collected royalties are returned to the state. Royalties are collected at the USO level and do not involve the planning process.

Geophysical exploration for oil and gas resources does not involve an allocation process. Geophysical exploration may be done prior to or after issuance of a lease. No permit is required.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Current resource area management practices for oil and gas resources begin with determining, through the category system, which areas are to be leased. The list in table 4111-2 shows current category acreages in the SJRA and the conflicting resource responsible for the acres under restrictive and no lease categories. Categories are shown on the Current Oil and Gas Categories overlay.

In the SJRA approximately 1,255,935 acres were under lease as of April 1985, including BLM administered leases on USFS lands. Production from 53 leases was approximately 2,161,112 barrels of oil and 20,266,923 million cubic feet of gas in 1983.

Exploration and development have been heavy since 1979. In FY 79, the SJRA handled 23 APDs for oil and gas. Since then there has been a significant increase: 62 in 1980; 100 in 1981; 56 in 1982; 91 in 1983; and 70 in 1984.

Geophysical activity is measured in miles of seismic line. In 1980 and 1981, seismic activities covered approximately 1,000 miles each year, with 1,400 miles each year in 1982, 1983, and 1984. This is an average of over 1,200 miles per year for the past 5 years. Most of this activity has been concentrated in the southeast portion of the resource area.

TABLE 4111-2

Oil and Gas Leasing Category Acreages and Protected Resources for Public Lands and Other Federal Minerals Administered by the San Juan Resource Area

Public Lands Administered by SJRA

	Bighorn Sheep	Recreation	Deer	Sage Grouse	Total
Category 1	NA	NA	NA	NA	897,296
Category 2	66,456	329,904	216,191	0	612,551
Category 3	27,075	85,325	0	1,720	114,120
Category 4	20,731	134,495	0	0	155,226
Total					1,779,193

Other Federal Mineral Acreage Administered by SJRA

GCNRA

Acreage open to mineral disposition	101,718
Acreage closed to mineral disposition	158,532
Total Acreage	260,250

USFS

Federal acreage administered by the SJRA	366,854

Navajo Indian Reservation

Federal acreage administered by the SJRA	51,607

The next phase where resource area management practices may be excercised is the operational phase of oil and gas exploration and development. Many controls are available on lease operations as provided in standard lease terms. CXs are typically used to assess potential impacts of drilling operations, based on the assumption that the critical environmental impacts were identified and mitigated when leasing categories were determined. In certain cases, an EA is prepared to assess environmental effects and determine mitigation.

The resource area applies surface management practices in the determination of surface use concurrence for an APD, and the MDO approves or denies APDs based on legal operational lease rights, acceptable downhole practices, and surface concurrence from the resource area. Management practices at this phase are determined by standard lease terms and special lease stipulations, regulations, formal operational orders, and manual guidance. This is also true for the establishment of KGSs and approval of unitization agreements by the USO, and the administration by the resource area of the Inspection and Enforcement program. Through these management practices, exploration for and production of oil and gas on public lands is managed to prevent unnecessary and undue environmental damage from operational activities after a lease is issued, and to maximize potential for exploration and production.

Known Fields and Production

There are 28 oil and gas fields within the SJRA, out of a total of 58 in San Juan County. These fields are given official status as KGSs. The KGSs within the resource area were listed in table 4111-1, and are shown on the Known Geologic Structures and Oil and Gas Shows in Plugged and Abandoned Wells overlay. Table 4111-1 also listed any other names by which the fields are known in published literature, as well as general location, size, cumulative production (to December 1983), and current status.

The 28 KGSs cover 73,717 public land acres in the SJRA and vary in size from 40 acres to 70,000 acres, with a mean field size of 2,168 acres. Two of the KGSs also cross onto the Navajo Indian reservation. Of the 70,000-acre Aneth field, approximately 15 percent is located on lands administered by SJRA, and the remainder is on the Navajo reservation. The Bluff field also occurs on the reservation, but the subsurface oil and gas have been reserved to the Federal Government.

The reservoirs are generally from 5,000 to 7,000 feet deep. Not all KGSs are currently producing; as of March 1985, 17 were producing, 4 were shut-in, and 7 had been abandoned.

Production from lands administered by the resource area for the year 1981 is listed in table 4111-3. Federal production totals were 2.16 million barrels of oil and 20 billion cubic feet of gas. Cumulative production from resource area fields listed in table 4111-1 has varied from the small Alkali Canyon Field, which produced approximately 4,000 barrels of oil and 40 million cubic feet of gas, to the huge Aneth complex which has produced 325 million barrels of oil and 308 billion cubic feet of gas. Total production from lands administered by the SJRA area is approximately 100 million barrels of oil and 500 billion cubic feet of gas.

TABLE 4111-3

Production Statistics for Federal and Nonfederal Lands in San Juan County (1981)

FEDERAL MINERALS		STATE MINERALS		INDIAN MINERALS	
1981 Production	Total Number of Producing (ible) Wells	1981 Production	Total Number of Producing (ible) Wells	1981 Production	Total Number of Producing (ible) Wells
Oil 2,161,112 Bbl		Oil 45,073 Bbl		Oil 5,940,514 Bbl	
Gas 20,266,923 MCF	188	Gas 58,106 MCF	3	Gas 5,242,655 MCF	580
Water 6,646,213 Bbl		Water 0 Bbl		Water 29,155,923 Bbl	

1981 Grand Totals - Oil 8,146,699 Bbl Gas 25,567,684 MCF Water 35,802,136 Bbl Wells Producing (ible) 771

Notes: 1 barrel (Bbl) = 42 U.S. gallons
1 MCF = 1,000 standard cubic feet

Source: DOGM, 1981.

SJRA also contains the largest unitization program in the state. Unit agreements are formed when regional geologic studies pinpoint areas that appear to offer logical prospects for exploratory drilling. Several leases are combined which cover the exploratory prospect to form the unit. The SJRA has four exploratory units covering 54,847 acres, and ten producing units covering 91,659 acres. If oil or gas is discovered in an exploratory unit well, it becomes a producing unit, and the boundaries shrink down to only that area shown capable of producing commercial quantities. These areas are then incorporated into a KGS, if not already within a known field. Over the course of a year, several units are formed and drilled, several expire for lack of discoveries, and a few become producing units. Therefore, a map showing unitized areas is constantly changing, but generally reflects areas of interest.

Planning guidance

The South San Juan MFP sought to encourage the development of oil and gas resources on federal land to facilitate increased domestic production, and to ensure that surface disturbance and long-term adverse environmental impacts are minimized and development is orderly and timely.

To accomplish this objective the recommendation was made to place the entire planning unit into the open category for oil and gas leasing. The planning decision modified this recommendation by allowing special category leasing for wildlife areas in Lower Red Canyon, Lower Wingate Mesa, Jacobs Chair, and Found Mesa, and for recreation areas in Grand Gulch, San Juan River, Hole-in-the-Rock Trail, Arch and Mule Canyons, Fish Creek, Slickhorn Gulch, Wingate Mesa, and Road Canyon.

The decision was also made to utilize existing roads in the remainder of the planning unit where possible, rather than constructing additional roads.

The Beef Basin MFP recommended the permitting of oil and gas leasing, exploration and production throughout the unit. The decision was made to proceed with the recommendation and to (1) provide close supervision of stipulation requirements, (2) practice good working relations with exploration companies, (3) withdraw from mineral leasing the Dark Canyon Primnitive Area and the proposed Beef Basin Primitive Area, and (4) not to allow surface occupancy on inventoried recreation and archaeological sites.

The Indian Creek-Dry Valley MFP recommended the allowance of Category 1 oil and gas leasing and exploration throughout the planning unit, with a review of any modifications to the recommendation to be made at 2-year intervals.

Current leasing categories at that time were kept in effect to protect wildlife and recreational values. Category acreage at that time included 101,663 acres in Category 2; 11,720 acres in Category 3; and a small amount in Category 4. The remainder of the planning unit was in Category 1. No acreages for Category 1 or 2 are listed in the MFP Decision documents.

The Montezuma MFP makes the same recommendations as the South San Juan MFP: to encourage development of oil and gas resources on public lands, with protection provided to certain recreational, wildlife, and archaeological resources.

Besides the planning guidance given in the MFPs, the BLM prepared an EA in 1975 that established oil and gas leasing categories statewide. The leasing categories tied sets of specified stipulations to leases subsequently issued in some areas, and closed other areas to oil and gas leasing. The categories established by the EA are still in effect.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County.

For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

Oil and gas production and exploration is the only existing industry associated with leasable minerals. There has been no production or interest for either tar sands or potash resources in the SJRA.

In 1983 the oil and gas extraction industry in San Juan County employed approximately 286 people (see table 4111-4), 40 percent of whom live outside the county (personal communication, Harold Lyman, Utah Department of Employment Security, May 1985).

Approximately 40 percent of the oil and gas production value in the county is from public lands in the SJRA. Based on this percentage, approximately 114 jobs are directly related to leasable mineral activity in the SJRA, 60 percent of which would directly involve local residents. Although many of the direct employment and income effects involve nonresidents, the local economy is affected by many of the resulting indirect and induced effects. Including these indirect and induced effects, the leasable mineral activities in the county generate 535 jobs and $13,000,000 of personal income, 75 percent of which is held and earned by county residents (see table 4111-5). The leasable mineral activities in the SJRA generate 100 jobs and $4.4 million of personal income, 75 percent of which is held and earned by county residents (table 4111-5).

Some of the governmental cost related to managing leasable minerals within the SJRA also contributes to local sales, and therefore to income and employment. These local governmental expenditures generate an estimated 7.1 jobs and $117,403 of personal income (see table 4111-6).

In addition to the income and employment effects, leasable mineral activity within San Juan County affects both the revenues and costs of local taxing jurisdictions. Related taxes bring an estimated $7 million to local taxing jurisdictions (see table 4111-7). Revenues generated from leasable mineral activities in the SJRA bring 40 percent of the revenues generated from these activities throughout the county. These revenue figures are thought to be conservative, as they do not account for all revenue sources and other miscellaneous taxes.

TABLE 4111-4

San Juan County's Leasable Mining Employment (by Place of Employment)

Mining Sector	1981 Employment (jobs)	1983 Employment (jobs)	Approximate Percent in the SJRA
Bituminous coal and lignite mining	7	---	0
Oil and gas extraction	312	286	40
Crude petroleum and natural gas	(108)	(128)	(40)
Natural gas liquids	---	---	0
Oil and gas field services	(204)	(158)	(40)
Totals	319	286	40

Source: UDES, 1985; UDES, 1982.

TABLE 4111-5

Total Local Income and Employment Generated by Leasable Mineral Activity, by Place of Work in San Juan County and the SJRA (1984 first quarter dollars)

	Direct, Indirect, and Induced Effects					
	San Juan County			SJRA		
Industrial Sector	Earnings[b] (dollars)	Employment (Jobs)	% of Total	Earnings (dollars)	Employment (jobs)	% of Total
Farm						
Private						
Mining	8,191,612	286	33	3,276,645	114.4	13.2
Construction	518,435	31.8	29.1	207,374	12.7	11.6
Manufacturing	159,219	11.2	9.0	63,688	4.5	3.6
Transportation & Utilities	191,811	11.2	5.9	76,724	4.5	2.4
Wholesale	310,470	15	20-25	124,188	6.0	8.0
Retail	734,162	74.8	23.8	293,665	30.0	9.5
F.I.R.E.[a]	273,495	15	45-50	109,398	6.0	18.0
Services	567,485	44.9	11.4	226,994	18.0	4.6
Government[c]	74,536	5.6	0.6	29,814	2.2	0.2
Proprietor		39.6	7.7		15.8	3.1
Total	11,021,725	535.1	14.5	4,408,690	214.1	5.8
Total Personal Income[b]	13,226,070			5,290,428		

[a] Finance, Insurance and Real Estate.

[b] Earnings include wage, salary and proprietor's income; personal income also includes dividends, interest, and rents, plus transfer payments and residential adjustments. Proprietor employment is not broken out by sector.

[c] Government sector figures only account for government enterprises such as the Post Office, and do not account for public administration.

[d] Many of those employed in the local oil and gas industry live outside the county.

Sources: USFS, 1982; BEA, 1984a; BEA, 1984b.

TABLE 4111-6

Local Importance of SJRA Leasable Mineral Program Related Costs (1984 fiscal year, 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Program (dollars)	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	180,750	78,263	5.9
Other Sectors[a]		39,140	2.2
Total		117,403	7.1

[a] Includes the direct, indirect, and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

Source: BLM Records; USFS, 1982.

TABLE 4111-7

Oil and Gas Related Taxing District Revenues (Calendar Year 1984 and Fiscal Year 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues due to Oil and Gas Activities in San Juan County	Revenues due to Oil and Gas Activities in SJRA
Taxes	$3,543,909	$582,906	$7,530,196	$11,657,011	$7,038,000	$2,886,000
Licenses and Permits	2,853	10,714		13,567		
Intergovernment	2,595,259	924,897	6,847,000	10,367,156		
Charges for services	227,039	82,810	148,000	457,849		
Fines and forfeitures	131,661	56,626		188,287		
Miscellaneous	970,241	285,855	447,820	1,703,916	10,000	4,000
Totals	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$7,048,000	$2,890,000

NOTE: Only taxes directly associated with the activity were assessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue sources are expected to be minor, these effects were not quantified. Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Yoakum, 1985; Smuin, Rich, and Marsing, 1984; Monticello, 1984; Utah Tax Commission, 1985; and Utah Foundation, 1985.

Jurisdictional costs could not be delineated and quantified.

CONSISTENCY WITH NON-BUREAU PLANS

Three other federal agencies, the State of Utah, and San Juan County enter into management of leasable minerals in the SJRA.

The NPS manages GCNRA, but mineral management was left with the BLM by P.L. 95-593. The law states that minerals within GCNRA shall be administered by the BLM under the same policies used on public lands.

As a result of the above wording, approximately 101,718 acres of land in the GCNRA have been left open to mineral disposition. The NPS has prepared a Mineral Management Plan (dated March 1980) for GCNRA, and the present practice is for the NPS to review lease applications and submit their recommendations to the BLM. In the event an APD is received, it would be handled in the same manner as with any other surface management agency. The BLM and NPS have both questioned the extent of each agency's authority regarding minerals in the GCNRA (January 1984 and November 1984, memorandums on file in SJRA).

Minerals on the National Forest are also managed by the BLM. The USFS reviews lease applications and makes recommendations to BLM. BLM issues the lease. APDs for USFS lands are processed and approved by the BLM, and the USFS is given appropriate opportunity to participate and provide input. An agreement between BLM and USFS was signed in Washington on June 19, 1984 to provide for mineral leasing on forest lands and adjacent private lands. The USFS Manti-LaSal National Forest management plan was signed on April 17, 1976. A new plan is due in spring of 1985.

The third federal agency is the BIA, which administers the surface of the Navajo Indian reservation in cooperation with the Navajo tribe. The BLM manages federal minerals where found on reservation lands. That portion of the Navajo Reservation known as the McCracken extension was given to the Navajo Nation, with minerals being reserved to the Federal Government (see MOU with Farmington Resource Area overlay). An MOU among the BLM State Directors of Utah, Colorado, Arizona, and New Mexico was signed in March 1983 in an attempt to clarify responsibility for mineral management where it involved Indian lands. The MOU states that the State Director of New Mexico will handle all oil and gas activity on the Navajo reservation. A conflict arose when it was discovered that New Mexico interpreted the MOU to mean only Indian minerals, and Utah interpreted it to mean surface and minerals on the reservation. This conflict was resolved by an addendum to the MOU signed by the BLM District Managers of Moab and Albuquerque on October 15, 1984, which provides for Utah to manage the minerals on that portion of the reservation in Utah containing federal leases, and New Mexico to manage minerals on that portion of the reservation containing minerals belonging to the Indians (see the MOU with Farmington Resource Area overlay). This agreement may be found in the 1782 file in the SJRA office. The Indians are considered the surface managing agency, and the practices for permit approvals follow those used on USFS lands.

Requirements of the State of Utah, through its Division of Oil, Gas and Mining, Department of Natural Resources, also affect the BLM's leasable minerals program. Confusion has recently arisen as to which agency has jurisdiction over operational aspects of the oil and gas program, particularly in regard to gas flaring, waste water disposal, and pressure maintenance operations. The agencies have been meeting at various organizational levels to resolve this confusion.

The San Juan County Master Plan, dated September 1968, recommends that oil and gas exploration and production be promoted and encouraged.

DATA GAPS

Data gaps in the oil and gas program occur principally in determining quantities of undiscovered oil and gas resources and the exact locations of such deposits. The only way to collect the data would be by drilling, an impractical alternative for BLM.

Additional data gaps exist in quantification of total wells drilled, producing, shut-in or abandoned, and total production. These data gaps are due to several factors, principally related to the age of activity in the area and the myriad of federal and state agencies and offices that had various administrative and record-keeping responsibilities in the area during that time. It should be noted that records over the past 10 years are much more accurate than the old records. Numbers given throughout this report, however, are relatively accurate, generally within 5 to 10 percent error, and serve to describe the magnitude of the oil and gas resources in the area.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

Even though worldwide demand for oil has decreased in the last 2 to 3 years, exploration and drilling activity in the SJRA have remained steady. This indicates a relatively high demand for the oil and gas in the SJRA, resulting from the comparatively low exploration and drilling costs in the shallow Paradox Basin.

Natural gas is not in heavy demand at this time, and operators are having problems in disposing of that resource. The apparent difficulty of initiating contracts that would enable operators to tap into major transportation lines discourages operators from constructing expensive collector lines, resulting in shut-in wells and requests for flaring and reinjection of produced gas.

The capability to meet the demand for the resource can be addressed from two standpoints: the capability of the SJRA staff to process applications and monitor operations; and the capability of the operators to obtain access to known fields in order to produce at a rate capable of meeting demand.

At current staffing levels, the SJRA can handle 75 to 80 APDs per year. A threshold can be established for the amount of geophysical activity that can be managed without endangering other resource values. With existing personnel, the SJRA probably crosses this threshold when more than four geophysical crews are working in the area at one time. When this threshold is reached, the present staff cannot properly manage nor monitor the geophysical activity. This threshold has been crossed 85 percent of the time in the past

3 years. The all-time high number of crews working in the resource area at one time was 12 during the summer of 1983.

From the operator's standpoint, capability to meet demand is established by several factors, one of which is access to productive areas, without unreasonable stipulations that would render reservoirs uneconomical. Other factors affecting their capability to meet demand are access to capital and drilling equipment; access to processing and refining facilities; weather; and competition, etc. With some exception, access to most fields in the SJRA is adequate. Recreational and floodplain constraints limit access at some points along the San Juan River, thus limiting production from otherwise productive reservoirs. Access is also restricted in WSAs, where wilderness impacting activities are regulated heavily under IMP, and sometimes denied on post-FLPMA leases.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

Future Demand

All indications are that future demand for oil and gas in the SJRA will increase, particularly in the long term. Although there has been a worldwide oil glut since 1983, activity in the Paradox Basin has remained high. Any increase in the price of oil would therefore bring an increased demand for oil and gas in the SJRA. The capability of the SJRA to meet operators' demands is questionable. At current staffing levels, little extra work can be handled without adversely affecting management of other resources.

Potential for Undiscovered Oil and Gas Resources

The capability of the resource to meet future demand depends on the presence of undiscovered oil and gas resources. Known resources will be depleted over time, with many fields expected to be abandoned by the year 2000. If undiscovered oil and gas resources are present, the SJRA would be capable of meeting increasing demand up to and beyond 2000.

The analysis of an area's potential for the occurrence of undiscovered oil and gas resources is based on many geologic factors. Of these, some of the more important are proximity and availability of source rocks, characteristics of potential reservoir rocks, potential for migration pathways, and availability of adequate trapping mechanisms. This type of information, based on widely spaced data points, can be inferred over broad areas in order to discern general locations that have more favorable geologic characteristics than do others. However, the difference between an area with good potential and the actual occurrence of commercial quantities of oil and gas can be ascertained only through actual drilling. Such critical production characteristics as reservoir pressure, water saturation, porosity, permeability, and chemical conditions, to name but a few, cannot be inferred over large areas and must be measured locally and directly. Often, even after oil and gas are discovered, complex and tedious measuring and testing must be accomplished before the significance of the find can be determined.

Keeping in mind the difference between potential and actual occurrence, the following discussion attempts to evaluate SJRA's potential for containing undiscovered resources of oil and gas. Based on the geologic analysis presented, it is possible to delineate three major geologic provinces, which define specific types of oil and gas occurrences and potential. These three areas are, in order of potential and importance; the Blanding Basin, the Paradox Fold and Fault Belt, and the Monument Upwarp (figure 4111-11). These are shown in more detail on the Oil and Gas Potential of Area overlay.

The Blanding Basin

The Blanding Basin is bounded on the west by Comb Ridge and the Monument Upwarp, and on the northeast by the Paradox Fold and Fault Belt. The area was located on the southern shelf of the Paradox Basin, on a broad structual platform that comprised a major accessway to the open sea during basin deposition.

This section of the basin formed an extremely favorable environment for bioherm mound buildups in the marine shelf and penesaline facies of the Desert Creek and Ismay cycles (see figure 4111-9). The excellent porosity of the bioherms provides ready reservoirs for hydrocarbons generated from the black shales deposited below and on top of the mound buildups. Excellent trapping mechanisms are present from impermeable shales and anhydrites deposited around and on top of the mounds. It should be mentioned that not all mounds are productive; in some instances, secondary chemical reactions have filled all available pore spaces with anhydrite. It appears that some structural enhancements of reservoirs resulted from movement along basement faults during deposition. The effect was relatively minor, however, and probably had more influence on lineation of bioherm groups than on creating actual fault traps.

Producing fields in the Blanding Basin show a wide range of sizes. The largest field is the Aneth, which has produced almost 350 million barrels of oil since its discovery in 1956. It is currently undergoing secondary recovery operations. Remaining recoverable reserves are probably no more than 40 to 50 million barrels. The field covers an areal extent of roughly 100 square miles. The next largest field in the Blanding Basin is the Ismay-Flodine field, which has produced approximately 15 million barrels of oil and covers roughly 12 square miles. Several fields range in size from 3 to 6 million barrels and seem indicate average field size. These fields produce from bioherms 3,000 to 5,000 feet long, 1,000 to 2,000 feet wide, and 30 to 50 feet thick.

Some question exists as to the size of potential undiscovered fields, due to the large discrepancy in sizes of known fields. From a statistical standpoint, there should be fields of intermediate sizes between 350 and 15 million barrels. None have been found to date. One explanation for the large size of the Aneth field may be its location on the access way to the sea during basin sedimentation. This area would have been one of the first to receive fresh nutrients when the sea level rose, and one of the last to have access to nutrients as the sea level fell. Algal mound colonies could proliferate under such conditions. From this aspect, it is doubtful that any large intermediate size fields remain to be found. Basinward drilling from the Aneth field seems to confirm this. Fields found in recent years in the

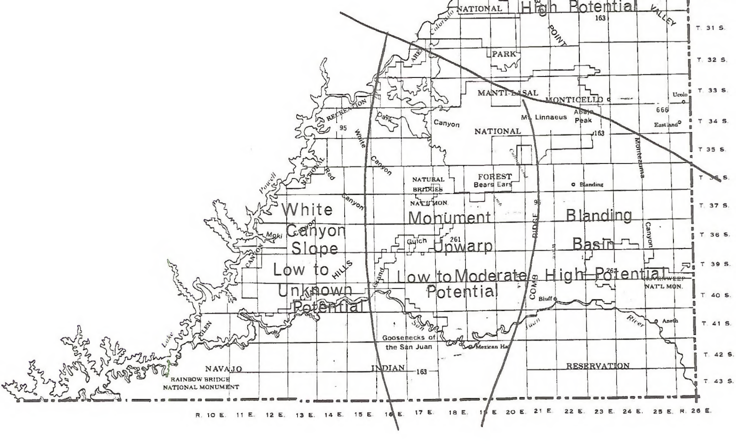

Paradox Fold & Fault Belt High Potential
White Canyon Slope Low to Unknown Potential
Monument Upwarp Low to Moderate Potential
Blanding Basin High Potential
GRAND COUNTY
SAN JUAN COUNTY
MOAB
MANTI-LASAL NATIONAL FOREST
CANYONLANDS NATIONAL PARK
Goblin Valley
Mineral Bottom
Dead Horse Point
Aztec Butte
LaSal
LISBON VALLEY
HATCH POINT
HARTS POINT
MONTICELLO
Abajo Peak
Mt. Linnaeus
Ucolo
Eastland
Blanding
Bears Ears
NATURAL BRIDGES NAT'L MON.
White Canyon
Red Canyon
Moki Canyon
Grand Gulch
COMB RIDGE
Montezuma Canyon
Bluff
Aneth
HOVENWEEP NAT'L MON.
Mexican Hat
Goosenecks of the San Juan
San Juan River
Colorado River
Lake Powell
GLEN CANYON NATIONAL RECREATION AREA
NAVAJO INDIAN RESERVATION
RAINBOW BRIDGE NATIONAL MONUMENT
R. 6 E. 7 E. 8 E. 9 E. 10 E. 11 E. 12 E. 13 E. 14 E. 15 E. R. 16 E.
R. 10 E. 11 E. 12 E. 13 E. 14 E. 15 E. 16 E. 17 E. 18 E. 19 E. 20 E. 21 E. 22 E. 23 E. 24 E. 25 E. R. 26 E.
T. 25 S. T. 26 S. T. 27 S. T. 28 S. T. 29 S. T. 30 S. T. 31 S. T. 32 S. T. 33 S. T. 34 S. T. 35 S. T. 36 S. T. 37 S. T. 38 S. T. 39 S. T. 40 S. T. 41 S. T. 42 S. T. 43 S.
46
95
163
261
262
666

FIGURE 4111-11

Areas of Favorable Oil and Gas Potential

Blanding Basin have been on the order of 2 to 5 million barrels, and it is reasonable to assume that any new fields found in the basin would be of similar size.

Drilling to locate these reservoirs would have to be on relatively close spacing due to sizes of the fields. When drilling for targets of this size, a difference of fewer than 100 feet can determine the success or failure of a well. Seismic surveys can help delineate favorable areas, but current technology makes it difficult to profile bioherms less than 50 feet thick; subtle changes in chemistry, which can drastically alter porosity and render bioherms incapable of containing oil and gas, cannot be delineated.

The more favorable locations in the Blanding Basin for locating new oil and gas fields are those areas north and northwest of the currently producing fields in and near the Aneth complex. The western limit is defined by the Comb Ridge Monocline and the Monument Upwarp. The northern and northeastern boundaries are defined by the transition zone between the thick trough evaporites of the fold and fault belt and the shelf carbonates of the Blanding Basin. The eastern boundaries go on into Colorado. The southern boundaries are defined by the producing fields. The boundaries are also well defined by mapping the transition zone between the penesaline and hypersaline facies, with the best potential along the transition zone of the penesaline with the marine shelf facies in the Desert Creek and Ismay zones of the Paradox Formation.

Paradox Fold and Fault Belt

The Paradox Fold and Fault Belt consists of a series of northwest-trending, salt-cored anticlines located along the northeastern and northern margins of the resource area. The fold and fault belt is bounded on the south by the Blanding Basin and on the southwest by the Monument Upwarp. Its northern boundaries go into the Grand RA to the Uncompahgre Uplift.

The location of the fold and fault belt was in the deep trough section of the Paradox Basin, where thick accumulations of salt were interlayered with black shales. This salt was then subject to subsurface flowage to the southwest, when a massive load of sediments was shed into the northeastern trough of the basin from the Uncompahgre Uplift, immediately after deposition of the Hermosa Group. This laterally moving salt encountered subsurface fault scarps, formed during the Mississippian and buried by the salts in the Pennsylvanian. These encounters forced the salt upward, doming the overlying strata and forming the salt anticlines seen at the surface today.

The oil and gas potential of the Paradox Fold and Fault Belt is associated with the structural features of the salt flowage and basement faulting. Two types of reservoirs are found in this region. The first are combined stratigraphic-structural reservoirs. Pre-Paradox Basin movement along deep, northwest-trending faults elevated Mississippian and Devonian age carbonates above sea level, where they were eroded and chemically altered. This resulted in porosity development in the carbonate banks. The banks and faults were subsequently buried by salt during basin deposition of the Paradox. The salt flowage episode resulted in black, organic-rich shales of the Paradox Formation being juxtaposed against the Mississippian and Devonian age reservoir rocks. Oil and gas formed in the black shales and then migrated into the adjacent reservoirs. Trapping mechanisms were therefore structurally and stratigraphically controlled in these reservoirs.

The second type of reservoirs are completely structure related. The salt flowage domed and fractured the black shales within the salt, and the hydrocarbons generated in the shales essentially remained in place with the trapping mechanism formed by overlying fine-grained dolomites and shales that were not as severely fractured. Production from these reservoirs comes directly from the Paradox Formation.

Salt thickness is the apparent limiting factor associated with this oil and gas potential. The extreme thickness and weight of salt accumulation in the Paradox trough resulted in rapid subsidence of deep basement faults along the transition zone between the trough and the marine shelf to the southwest. Where the salt thinned and pinched out on the marine shelf, the associated decrease in sediment weight resulted in less structural adjustment along the faults. When salt flowage began, those areas of thickest salt and greater subsurface structural relief were the most severly affected.

As the salt thinned to the southwest, the salt flowage and associated structural movements diminished to the point of no effect. This boundary can be defined in a number of ways, such as the approximate trend of the boundary between the penesaline and the marine shelf facies of the Paradox Formation, or areas where salt thickness is less than 3,000 feet. This area extends to the southwest beyond the obvious salt anticlines seen at the surface: the Lisbon Valley in SJRA and Grand RA and the Spanish Valley and Cane Creek anticlines in Grand RA. The effects were diminished at the surface, but still active in the subsurface, where the salt and shale beds have mildly domed the overlying strata.

As with the Blanding Basin, the size of productive fields in the Paradox Fold and Fault Belt shows a wide variation, particularly in the combined structural-stratigraphic Mississippian reservoirs. Recoverable reserves in this type of field range from the Lisbon field in SJRA, with an estimated 50 million barrels of oil, to 1.5 million barrels at the Salt Wash Field, 150,000 barrels at Big Indian, and 90,000 barrels at the Big Flat field, all in Grand RA. Recoverable reserves in Paradox Formation structural traps are considerably smaller, ranging from 1 million barrels of oil at the Long Canyon field to 67,000 barrels at Shafer Canyon and 40,000 barrels at Bartlett Flat, all in Grand RA. A number of other small Pennsylvanian fields have been discovered and abandoned due to poor production characteristics of the shale and salt zones. The potential sizes of Mississippian fields in the fold and fault belt would probably not be any larger than the Lisbon field at maximum. The potential sizes of Pennsylvanian fields would likewise be of the same magnitude as those already found. However, the Pennsylvanian fields have the potential for larger recoverable reserves, perhaps on the order of 1 to 3 million barrels of oil, if well completion and production problems can be overcome. The recent (1984) discovery of such a field in Grand County promises to overcome this production related problem.

Monument Upwarp

The Monument Upwarp is a large, north-south-trending, structural uplift found in the southern and western regions of the SJRA. Approximately 7,800 feet of structural relief occurs on lower Paleozoic strata on the upwarp (Woodward and Clyde, 1982), as a result of Laramide tectonics during the Cretaceous to Tertiary time period. The eastern boundary of the upwarp is formed by the Comb Ridge Monocline, the northern boundary by the fold and fault belt. The southern end of the upwarp is in the Monument Valley area of northern Arizona, and the western edge grades from the White Canyon slope into the Henry Basin in Wayne and Garfield Counties (figure 4111-1).

The Monument Upwarp region was located on the southwestern marine shelf of the Paradox Basin during Pennsylvanian deposition. The Comb Ridge element of the upwarp was tectonically active during basin sedimentation of the Paradox evaporites. It formed a northward-trending structural salient from the southwest shelf of the basin. It acted as a peninsular barrier that was emergent, or nearly so, during time of low sea level and maximum evaporation. Consequently, no salt was deposited along its crest. During high stands of sea level, the crest of the fold received only black shale and carbonate sediments. Bioherm mounds were also formed along the crest of the uplift; in fact, this uplift may have enhanced their formation, as the area would have been closer to the surface during high sea levels.

Structural relief along the Comb Ridge during the Pennsylvanian was not as extensive as the present structural relief of the entire Monument Upwarp. Consequently, the occurrence of this salient in effect created a small, separate subbasin that lies just west of the main Paradox. This subbasin contains up to 800 feet of Paradox Formation evaporites, with salt up to 100 feet thick. The relatively sparse drilling data in the area also indicate that, overall, the Desert Creek Formation is thicker in this subbasin than in the Blanding Basin, over 200 feet thick in some places.

The only known fields in the Monument Upwarp are the Mexican Hat field and the Lime Ridge field, both in SJRA. The Mexican Hat field is a remnant oil field, which produces from the Honaker Trail Formation of the Hermosa. The field is only 200 to 300 feet deep, and covers roughly 150 acres. Production since discovery in 1908 amounts to 50,000 barrels of oil and 320 thousand cubic feet of gas. The Lime Ridge field was a very small (one well) gas field, which produced 1.5 million cubic feet of gas from small bioherms in the Ismay, Desert Creek, and Akah members of the Paradox Formation. The field produced sporadically from 1959 to 1967 before being abandoned (Four Corners Geological Society, 1978).

There have been 132 wells drilled on the Monument Upwarp, with 40 of them encountering oil and gas shows in the Paradox and Honaker Trail Formations. While no significant fields have yet been found, drilling results indicate the likelihood of discovering producing fields. A good portion of the upwarp has never been drilled due to the rugged terrain; overall, the upwarp has been only sparsely tested.

The only potential fields would be in bioherm reservoirs. Combined with the thick Desert Creek buildup in the area, which enhances source rock potential, the Monument Upwarp contains a good potential for undiscovered oil and gas fields. Potential reservoir sizes would be similar to those bioherm reservoirs on the smaller end of the spectrum in the Blanding Basin, perhaps on the order of 1 to 5 million barrels of oil and 10 to 20 million cubic feet of gas.

One factor which somewhat reduces potential of the Monument Upwarp, principally on the southern and northwestern margins, is the depth of erosion into the uplift. Laramide tectonics were responsible for the large structural relief of the upwarp. This, combined with regional uplift of the entire Colorado Plateau geographic province during the past 10 million years, has resulted in deep erosion into the uplift. The San Juan River, cutting east to west across the uplift, has exposed the upper beds of the Honaker Trail Formation. The Colorado River, cutting across the northwest margin of the uplift, has exposed the Honaker Trail Formation and has cut as deep as the Akah zone in the Paradox Formation. In addition, the upper sections of the Honaker Trail have been exposed in Dark Canyon, running east to west across the northern end of the uplift.

The effects of such deep erosion are often the breaching of the reservoir formation and potential flushing of reservoirs due to the subsequent release of pressure. Dead oil shows in several wells on the uplift indicate that such flushing has occurred, but the extent of its occurrence throughout the uplift is not known. There is over 2,000 feet of structural closure on the uplift between the crest and the exposures of the Hermosa in Cataract, Dark, and San Juan Canyons. This, combined with the large extent of closure, indicates that it is unlikely the entire structure was flushed. Therefore, potential remains for new field discoveries on the Monument Upwarp.

White Canyon Slope

Although not identified and discussed as a major tectonic location, the White Canyon slope on the western margin of the Monument Upwarp covers a small section of public lands on the extreme western margin of the SJRA. This area forms a gentle westward slope off the western flank of the Monument Upwarp, into the eastern flank of the Henry Basin (see figure 4111-1), and its oil and gas potential is very similar to that of the Monument Upwarp, with one exception.

A potential exists for oil accumulation in the Permian age White Rim sandstone, a lateral beach sand equivalent of the Cutler Group. During the deposition of this beach sand, the shoreline essentially followed the northeast-trending Colorado basement lineament, with the sea to the northwest. This beach sand pinched out into undifferentiated, fine-grained sediments of the Cutler Group in the White Canyon Slope region.

Immediately north of this area, in the Orange Cliffs, similar conditions have resulted in the formation of the Tar Sand Triangle, a 12-billion-barrel tar sand deposit found in the pinch-out of the White Rim Sandstone. The occurrence of the tar sand resulted when all reservoir pressure was released

from erosive breaching of the White Rim. The oil in the tar sand is believed to have originated to the west and southwest from the Kaibab Limestone in the Henry Mountains Basin, and beyond, in the Grand Canyon region. The oil migrated eastward from these areas and was trapped in the updip pinch-out of the White Rim.
No wells have penetrated the White Rim Sandstone in the White Canyon Slope area; the potential is, therefore, completely unknown. The White Rim has not been breached by erosion in this area, so the speculation on sizes of potential oil fields here is interesting. Certainly, there is a remote possibility that a field as large as the Tar Sand Triangle could exist, but there is no evidence from which to work.

Summary of Oil and Gas Potential

In summary, the entire SJRA appears to have potential for undiscovered oil and gas resources. Certainly some areas, principally the Blanding Basin, have a better potential and higher certainty for occurrence than do others. The Paradox Fold and Fault Belt has excellent potential also, but with expected field sizes smaller and certainty not quite as high. The Monument Upwarp ranks third in prospective potential, with expected field sizes small, and uncertainty of occurrence higher, due to erosional breaching of the anticipated reservoir formation. The White Canyon Slope of the Monument Upwarp would rank fourth, with great potential but a very high degree of uncertainty as to occurrence. These areas have been depicted in figure 4111-10.

Industry activity in the Paradox Basin is consistent with the geologic ranking of areas of potential. A great deal of seismic work continues in the Blanding Basin and Paradox Fold and Fault Belt. The Blanding Basin has a great deal of ongoing development and exploration drilling, while the fold and fault belt has mostly been drilled from an exploratory standpoint, and not nearly to the levels of the Blanding Basin. The Monument Upwarp has been sparsely drilled, with both encouraging and discouraging results. Recent activity has been quite low, but one of the biggest factors in lack of recent drilling has been related more to rugged terrain and IMP restrictions than to lack of potential.

CRITICAL THRESHOLDS

Critical thresholds are difficult to define, mainly because the quantity of oil and gas resources occurring in the SJRA is unknown. If the total quantity of available oil and gas were known, the point at which management decisions would affect ultimate recovery could be ascertained. However, certain broad-based assumptions can be made regarding critical threshold levels.

A decision to lease no further lands for oil and gas would cross a critical threshold. Production would soon decline, and oil and gas companies could not use oil and gas from the SJRA to meet demand. But there would be little actual impact to the oil and gas resource; it would remain in place for use at some point in the future. Therefore, the adverse impact of crossing a critical threshold level by allowing no further leasing would be to oil and gas producers and to the local socioeconomic infrastructure.

Such a management decision could pass another critical threshold level and impact the resource, if it forced operators to increase production levels from wells previously under lease to meet demands, and in so doing, to exercise bad production techniques that would cause oil and gas to remain in the reservoir, unable to be recovered in the future.

As previously mentioned, critical threshold levels cannot be easily quantified. However, the analysis of the past and current situation indicates that a critical threshold could be reached if the right to lease and develop oil and gas resources is denied through significantly restrictive oil and gas leasing categories. This could occur if no surface occupancy or no lease categories were applied to a large percentage of the resource area.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

The current oil and gas leasing category system has resulted in several inconsistent decisions and losses before the IBLA when the category system has been challenged.

The major problem is on the San Juan River, where the original intent was to have category 3, no surface occupancy, within 0.25 mile of the river in order to protect recreational river users from seeing exploration or development activity while on the river. The intent also included concern for the floodplain and for wildlife along the river.

When maps were prepared for delineating the categories, lines were drawn along the 1898 survey, thus leaving the area accreted since 1898 in category 1, open to leasing, instead of a no surface occupancy category. The incorrect maps were forwarded to the USO, and leases have been issued accordingly.

Leasing categories in the Beef Basin area have been challenged before IBLA (see 76 IBLA 395, 1983) in an appeal regarding a category 4 area, not open to lease. IBLA upheld the appellant on the grounds that BLM's analysis was too general, and that BLM had failed to analyze impacts from leasing with a category 3, no surface occupancy stipulation, instead of altogether denying the lease. The case was remanded to BLM for further analysis.

Decision 70 IBLA 259 stated that the BLM policy of not leasing portions of unsurveyed sections was in error. BLM's policy had been that when an unsurveyed section was divided into two or more leasing categories, the most restrictive category was applied to the entire section at the time of leasing. IBLA made it clear that there is no limitation on issuance of leases on less than full unsurveyed sections.

Other category problems are related to wildlife. Some wildlife problems were not addressed during development of the category system. These problems are (1) eagle habitation along the San Juan River during winter and (2) prairie dog colonies, which must be protected because they are potential habitat for the black-footed ferret (cross-reference: Wildlife, Part I and Wildlife Habitat Management, Part II).

Lease stipulations aimed at protecting wildlife are often inadequate in addressing habitat requirements, or unnecessarily restrict oil and gas activities.

It often happens that, as the expiration date approaches, an operator wants to drill to hold the lease, but cannot because of seasonal restrictions to protect wildlife. This situation is reviewed on a case-by-case basis, with the resource area sometimes allowing and sometimes denying the proposal. The main criterion used to make this decision is whether or not wildlife are actually using the area. An example might be a mild winter when deer do not move into their normal winter range. This approach leads to inconsistency and hence to criticism from oil and gas interests, as well as from wildlife interests.

In some cases, especially along the San Juan River, lease categories did not consider serious wildlife concerns, such as eagle nesting sites, which are protected under the Endangered Species Act, and prairie dog colonies. Many leases were issued without stipulations regarding these concerns.

In the past, no correlation has been made between establishment of oil and gas leasing category restrictions and oil and gas resource potential. This could lead to areas of high potential or known resources being hampered by surface resource restrictions that may not accurately represent the highest and best uses of all resources.

MANAGEMENT OPPORTUNITIES

Management of oil and gas is very well directed through laws, regulations and policy. The greatest opportunity for resolving management conflicts is to re-evaluate the leasing category system.

This re-evaluation could resolve conflicting lease stipulations in adjacent areas along the San Juan River. It can also identify overly restrictive category stipulations and bring them into harmony with IBLA decisions and current national BLM policy. It could serve to weigh lease restrictions against known or potential oil and gas resources.

Category adjustment is neither a complete nor an immediate solution to all of these problems. Many areas of concern are covered with current leases that have to run their limit. In some cases, the leases are producing and will not expire until the resource is depleted.

The opportunity exists to evaluate cummulative impact of geophysical activities on the public lands. The RMP could be used to determine what areas, if any, would suffer unnecessary and undue environmental degradation if geophysical activities occurred.

The capability for operators to explore for new fields and produce from existing fields can be partially facilitated by administrative decisions, as well as by decreasing restrictive leasing stipulations.

ACEC POTENTIAL

No potential ACECs have been identified for oil and gas in the SJRA. The oil and gas resource is not believed to require special management to protect critical environmental concerns. The resource value of the in-place oil and gas deposit does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGMENT PROGRAMS

The constraint placed on leasable minerals by cultural resource management is heavily felt in SJRA. Several federal acts provide for the protection of these resources. Avoidance is the main form of protection being used in the resource area. Avoiding cultural resources often prevents an operator from exploring exactly where he prefers to; it sometimes affects other resources or sound construction practices, such as road construction, where avoidance of cultural resources may preclude proper road alignments or grades.

Management of oil and gas is also constrained by wildlife requirements. The avoidance of certain areas, either permanently or during certain seasons or periods, adversely impacts the leasable minerals program. Although these constraints vary in purpose and season, their accumulation has a significant impact on mineral lease development. Closures have been placed on certain areas at certain times for deer wintering, prairie dog colonies, bighorn sheep, eagles, and sage grouse strutting grounds. The UDWR has been critical of BLM's failure to close areas to mineral leasing activity during hunting seasons for deer and bighorn sheep.

Recreation concerns have caused 549,724 acres to be placed in no lease, no surface occupancy, or a special stipulation category (see table 4111-2). These categories have restricted oil and gas exploration and development. Of these acres, 387,020 are now in WSAs. Some WSA acreage contains pre-FLPMA leases, but exploration and development have been difficult because of IMP requirements. Once the existing leases expire, the acreage will not be leased again until released from wilderness review by Congress.

DOCUMENTED PUBLIC CONTROVERSY

Controversy arose during 1982 and 1983 when the SJRA office received several letters (see the SJRA 8100 files) from people in the archaeology profession stating that oil and gas activity, mainly in the Alkali Ridge area, was causing direct and indirect damage to the cultural resource.

Other public controversy arose from drilling and geophysical activity in Cheesebox, Fish Creek, Road Canyon, and Squaw Canyon WSAs. Segments of the public opposed any actions in these areas. This controversy is documented in the IMP files for the identified WSAs located in the MDO.

APPENDIX 4111-A

National Minerals Management Policy
May 1984

Except for Congressional withdrawals, public lands shall remain open and available for mineral exploration and developement unless withdrawal or other administrative action is clearly justified in the national interest.

BLM actively encourages and facilitates the development by private industry of public land mineral resources in a manner that satisfies national and local needs and provides for economically and environmentally sound exploration, extraction, and reclamation practices.

BLM will process mineral patent applications, permits, operating plans, mineral exchanges, leases, and other use authorizations for public lands in a timely and efficient manner.

BLM's land use plans and multiple use managment decisions will recognize that mineral exploration and development can occur concurrently or sequentially with other resource uses. The Bureau further recognizes that land use planning is a dynamic process and decisions will be updated as new data are evaluated.

Land use plans will reflect geological, energy and mineral values on public lands through more effective geology and energy and mineral resource data assessment.

BLM will monitor salable and leasable mineral operations to ensure proper resource recovery and evaluation, production verification, diligence and inspection and enforcement of the lease, sale or permit terms. BLM will ensure receipt of fair market value for mineral commodities unless otherwise provided for by statute.

The Bureau will maintain effective professional, technical, and managerial personnel knowledgeable in mineral exploration and development.

/s/ Robert F. Burford, Director

4112 COAL LEASING

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Coal Resource Map.

RESOURCE OVERVIEW

The mines and prospects of this area have been closed since 1971. Coal activity has been limited to four areas, all in the San Juan Coal Field. This field contains about 530,000 acres, with about 318,000 acres being privately owned (surface and mineral estates) and about 212,000 acres on the public lands. The first area is located along the Recapture and Johnson Creek exposures of the Dakota Sandstone in T. 35-36 S., R. 22-23 E. (cross-reference: Geology, Part I). Outcrops in this area show only thin streaks of carbonaceous and bituminous shale.

The second area is near Monticello, where several openings (presently unlocatable) show stringers of coal 2 to 10 inches thick. Four miles north of the town, exact location unknown, an impure bed 2.75 feet thick has been reported.

The third area is situated south of U.S. Highway 666 in the vicinity of Lockerby and Eastland Communities in T. 34 S., R. 25-26 E., near the Colorado state line. Four prospect holes exist near the NW 1/4 Sec. 22, T. 34 S., R. 26 E. The most important was the Crepo Mine (Gregory, 1929). A bulldozed outcrop in the SW 1/4 Sec. 26, T. 34 S., R. 25 E., just north of the road, represents the best showing in the field. Here 3 feet of coal are underlain by an additional 3 feet of impure coal (Doelling and Graham, 1972).

The last group of prospects are those located along Piute Creek. Several pits were opened in this area, some of which operated intermittently from 1927 to 1929. An attempt to reopen the Rasmussen mine occurred in 1947, but no production was achieved. Here there is a coal bed 1.5 feet thick underlain by 0.1 foot of sandstone and then 1 foot of coal. This mine is located on Lot 2, Sec. 35, T. 33 S., R. 26 E., adjacent to the Colorado state line. Production of coal from the San Juan region has been insignificant (Doelling and Graham 1972).

From the available data on the San Juan Coal Field, no reserves occur in beds 4 feet or more thick and, because of the discontinuity of coal beds, reserves for beds between 14 and 48 inches are difficult to calculate.

Geology, Occurrence, and Known Structures

The Cretaceous strata of the San Juan Coal Field is made up of three units, the Burro Canyon Formation, the Dakota Sandstone, and the Mancos Shale.

The strata of the major part of the San Juan Coal Field dip slightly to the south into the Blanding Basin centered just north of the San Juan River. This regimen changes at the Boulder Knoll Anticline in the northeast sage plain area and, in the vicinity of Summit Point, a slight northeasterly dip occurs. This inclination rarely exceeds 3 degrees in the San Juan field.

Faults do not cut the coal bearing formation to a great extent except in two zones, the Shay and Verdure Grabens. These east-west structures are located north and south of the Abajo dome. In the area where the Shay Graben may affect the coal horizon, the throw is 0 to 100 feet. The Verdure Graben faults have throws of 180 feet in the Montezuma Canyon area.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

The Federal Coal Leasing Amendment Act of 1976;
The Surface Mining Control and Reclamation Act of 1977;
The Act of February 25, 1920 (the Mineral Leasing Act);
General coal management regulations found at 43 CFR 3400; and
MOU among BLM, USGS, and OSM regarding Management of Federal Coal.

RESOURCE ALLOCATIONS

Coal resources are allocated through a coal lease. Exploration can occur under license before a lease is issued.

Prior to issuing coal leases, the BLM is required to delineate areas considered unsuitable for all or certain stipulated methods of coal mining. The requirements for this review, called coal unsuitability criteria, are mandated by Section 522(a) of SMCRA and are found at 43 CFR 3461. The criteria are applied through the BLM's land use planning process (see 43 CFR 1610.7-1).

At one time the BLM designated KRCRAs. This designation was discontinued after passage of the Federal Coal Leasing Amendment Act of 1976. No KRCRA was in place for the San Juan Coal Field. However, in 1971 the USGS showed the field as lands valuable prospectively for coal.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

The poor showing of coal in the San Juan Coal Field has not prompted much previous work in the SJRA. Up to the present (1985), indications are that not enough coal is present to ever develop a commercial field in the area. The probability that a coal leasing program will be initiated within the resource area is further diminished by the fact that approximately 60 percent of the San Juan Coal Field in Utah is under private ownership of both the surface and the mineral estate.

IMP governs coal activities within WSAs and ISAs. Coal mining activities were not ongoing in any WSA or ISA at the time FLPMA was passed, so this is not a grandfathered use; no coal exploration or mining activities have occurred under IMP.

Current planning is silent on coal. The Indian Creek-Dry Valley MFP mentioned coal but deferred formulation of management objectives.

SOCIOECONOMIC CONSIDERATIONS

There is no current (1985) exploration, development, or leasing of coal in the SJRA. Therefore, no social or economic considerations have been identified.

CONSISTENCY WITH NON-BUREAU PLANS

The majority of the San Juan Coal Field is not managed by the BLM. Coal is not addressed in any formal land management plan for non-BLM surface within the resource area.

DATA GAPS

None identified.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

There is presently no commercial demand for the coal deposits within the SJRA, except perhaps for domestic use.

No work months have been allocated for a coal program in the resource area in the past 5 years (since at least 1980).

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

No changes are anticipated in SJRA that would create a sizeable demand for coal. If there were a large demand for coal in this area, the resource area could not meet this demand because of economics and the thin coal beds. Furthermore, the Bookcliffs Coal Field, which has coal beds up to 5 feet thick, would be a strong competitor to meet such a demand.

No work months are expected to be allocated for coal management within SJRA during the next 10 years (at least until 1995).

CRITICAL THRESHOLDS

No critical threshold was identified for coal resources in the SJRA, because of the low potential for development.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current management is adequate.

MANAGEMENT OPPORTUNITIES

At such time as an interest is expressed for a coal lease, or at such time as the BLM may determine that the economic viability of coal resources present would support development of the San Juan Coal Field, an unsuitability study will be done in accordance with 43 CFR 3461.

This will not be done in the San Juan RMP, however, because no interest has been expressed for coal leases in this area, and no demand for leases is anticipated over the next 10 years (until at least 1995).

An unsuitability study would require a planning amendment or revision to the RMP, regardless of whether the lands were found to be suitable or unsuitable for coal leasing (see 43 CFR 1610.7-1).

ACEC POTENTIAL

No potential ACECs have been identified for coal resources in the SJRA. The coal resource is not believed to require special management to protect critical environmental concerns. The resource value of the in-place coal deposit does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

No constraints are foreseen from other resource management programs.

DOCUMENTED PUBLIC CONTROVERSY

None.

4113 GEOTHERMAL MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Known Geologic Structures (West Half)

RESOURCE OVERVIEW

Geothermal resources are a limited commodity within the SJRA. Only one area, called Warm Spring Canyon, has been identified to have a potential for geothermal development within the resource area. This identified area of about 69,120 acres is in the vicinity of Dark Canyon and Cataract Canyon on the Colorado River. The majority of the acreage lies within the GCNRA. Only 16,317.6 acres are on public land in SJRA. Another 20,048 acres are within the RA boundary but are managed by GCNRA. The remaining acreage is outside the SJRA boundary.

There is presently (August 1985) little information available about the Warm Spring Canyon prospectively valuable tract, when it was formally identified, or what evidence supported the finding of prospective value. The existence of a warm spring (91 degrees F) was reportedly first discovered by John Wesley Powell during his exploration of the Colorado River (Janssen, 1978). The USGS later identified it as a part of their resource identification and evaluation programs.

The Warm Spring Canyon tract lies in remote and inaccessible territory. Of the 16,317.6 acres of the tract on public lands, 10,759 acres are within Dark Canyon PA, a wilderness ISA, and the remaining 5,558.6 acres are in Middle Point WSA.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

The Geothermal Steam Act of 1970.

FLPMA, Section 102.

Geothermal leasing regulations are found at 43 CFR 3200.

RESOURCE ALLOCATIONS

Geothermal resources are allocated by either competitive or noncompetitive leases, depending upon the amount of interest expressed in an individual tract. Tracts that receive only one application for lease during an application filing period are leased noncompetitively.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Geothermal resources were not actively managed in the SJRA during 1980-1985. No management recommendations or decisions were recorded in the Beef Basin MFP in 1973 which covered the geothermal area. There is a summary of the geothermal situation in the SJRA in a URA update that was prepared for the Beef Basin Unit dated 1978, but no MFP update was prepared using this information.

If geothermal resources on GCNRA were leased, the BLM would be reponsible for issuance of leases (at USO) and administration of lease activities (at SJRA). Any lease activity would be done only with the concurrence of GCNRA.

SOCIOECONOMIC CONSIDERATIONS

There is no current (1985) exploration, development or leasing of geothermal resources in the SJRA. Therefore, no social or economic considerations have been identified.

CONSISTENCY WITH NON-BUREAU PLANS

The NPS Mineral Management Plan for GCNRA was approved in March 1980. Although the majority of the Warm Spring Canyon identified area is within GCNRA, no discussion of the management of geothermal resources is found in the plan. Most of the geothermal area (about 14,000 acres) lies within the Recreation and Resource Utilization Zone of management in GCNRA, which does not preclude minerals leasing. The remainder (about 6,000 acres) falls within the proposed Dark Canyon Wilderness, where minerals leasing is now excluded.

DATA GAPS

Not much is known about the Warm Spring Canyon geothermal area. More information about temperatures, flows, and the extent of the geothermal resource would need to be gathered before any informed decisions could be made about management of the geothermal area.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

There has been no demand for this geothermal resource during 1980-1985. No work months have been allocated to the geothermal program during that time.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

The future demand for geothermal resources in this RA is not predictable, but it is expected to remain low because of the small size of the the identified area, its remoteness from population centers, and the inacessability of the area in general.

CRITICAL THRESHOLDS

A critical threshold for geothermal resource management would be reached if the Warm Spring Canyon area suddenly generated a lot of interest and a lease application was received.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current management of geothermal resources is adequate for the scope of the present geothermal program.

MANAGEMENT OPPORTUNITIES

At such time as a lease application is received for Warm Spring Canyon, BLM will analyze the environmental consequences of leasing and determine whether a lease can be issued.

ACEC POTENTIAL

No potential ACECs have been identified for geothermal resources in the SJRA. The geothermal resource is not believed to require special management to protect environmental concerns or to safeguard the public from natural hazards. The resource value of the in-place geothermal resource does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Since the entire acreage of the geothermal area that is on public lands also falls within WSA or ISA boundaries, IMP would severely restrict exploration or development of geothermal resources. After congressional action on the wilderness designations for Dark Canyon and Middle Point, the potential geothermal resources could be locked up indefinitely inside designated wilderness areas.

DOCUMENTED PUBLIC CONTROVERSY

None.

4114 OIL SHALE/TAR SAND LEASING

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Known Geologic Structures (West Half).

RESOURCE OVERVIEW

No oil shale reserves are known to occur within the SJRA. Tar sand resources are known to occur in the White Canyon area in the western part of the resource area.

The White Canyon area rests on the west flank of the Monument Upwarp, a large regional structure that extends from northern Arizona into southeastern Utah. The area consists of a gently westward-dipping plateau that has been deeply cut by White, Red, and Dark Canyons and their tributaries. The tar sand deposit itself lies on an isolated mesa bounded by Long and Short Canyons on the southeast and by Fortknocker Canyon on the northwest.

The stratigraphy exposed in the area of the tar sand deposit ranges in age from the Permian Cutler Formation to the Triassic Chinle Shale (cross-reference: Geology, Part I). The tar sand deposit is found in the basal Hoskinnini Member of the Moenkopi Formation of Triassic age. The Hoskinnini is a reddish-brown, poorly sorted calcareous sandstone that forms vertical cliffs at most places and weathers to a light brown color in sections with bituminous inclusions. The Hoskinnini has been measured in several White Canyon locations and appears to maintain a consistent 80-foot thickness.

Very little detailed study and no comprehensive sampling program has been carried out on the tar sand deposits in the White Canyon area, so there is no known quality or quantity of reserve. In general, the deposit is about 7 miles long and ranges from 0.5 to 1 mile in width. The Utah Geological and Mineralogical Survey has designated the area a zone of weak petroleum shows, and Ritzma (1979) estimated 12 to 15 million barrels of oil in place. While the Hoskinnini Member has an average thickness of 80 feet in the area, no known measurement of the bituminous zone itself has been made. Overburden ranges from 0 to 480 feet thick over the deposit.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

Mineral Lands Leasing Act of February 25, 1920;
Combined Hydrocarbon Leasing Act of 1981; and
Combined hydrocarbon leasing regulations at 43 CFR 3140.

RESOURCE ALLOCATIONS

Tar sand development can take place on oil and gas leases issued after passage of the Combined Hydrocarbon Leasing Act of 1981 (November 16, 1981). On leases issued prior to that, tar sand development can take place only on a CHL in an STSA. STSAs were identified by USGS and created in 1980 and 1981 to facilitate conversion of oil and gas leases to CHLs. CHLs are subject to category restrictions, similar to oil and gas leases.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Tar sand is not now actively managed within the SJRA. Although there is an upward trend in tar sand development within Utah, and the development of the technology necessary to extract the hydrocarbons from tar sand was in the beginning stages in 1984, industry has shown no interest in the tar sand within the SJRA.

White Canyon STSA, an area of approximately 10,469 acres, was established by USGS on November 10, 1980. Within the STSA, 2,400 acres are State lands and minerals, 90 acres are private lands and minerals, and the remaining 7,979 acres are public lands and minerals. Only federal minerals are subject to CHL requirements. Holders of oil and gas leases and mining claims within the STSA at the time of the designation were granted an opportunity to convert their holdings to CHLs between November 1980 and November 1983. Leases could be converted upon written application and the submission of a plan of operations that presented the details of an exploration plan for assessing the tar sand deposit. No applications for conversion were received for the White Canyon STSA. Any future leases within the STSA after the present leases expire will be CHLs obtained through competitive bonus bidding. A total of 70 acres of the STSA is in category 3 or 4; the remainder (about 7,910 acres) is in category 1 (open to leasing).

Wilderness IMP could restrict tar sand development in the resource area, because there is an overlap of approximately 15 acres between the White Canyon STSA and Dark Canyon ISA. However, there is no current conflict between the ISA and the STSA, because of the lack of demand to develop the White Canyon deposit.

Current planning guidance is silent on tar sand management. None of the current MFPs address tar sand. The White Canyon STSA was briefly addressed in the statewide tar sand EIS (BLM, 1984c).

SOCIOECONOMIC CONSIDERATIONS

There is no current (1985) exploration, development, or leasing of tar sand in the resource area. Therefore, no social or economic considerations have been identified.

CONSISTENCY WITH NON-BUREAU PLANS

No non-Bureau management area within the boundaries of SJRA has a known tar sand deposit; therefore, non-Bureau plans will not be analyzed here.

DATA GAPS

The actual extent of the tar sand deposit, as well as that of petroleum reserves, is unknown. This situation will continue until exploration and development companies perform physical drilling and testing.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

Up to the present time (January 1985) there has been no demonstrated demand for the tar sand in this resource area. No work months were allocated to the resource area for tar sand management in FY 1984.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

There may not be a demand for the White Canyon tar sand deposit before the year 2000. The White Canyon deposit is thought to be of much poorer quality than other Utah deposits, and no technology has yet been developed that will make synfuels production competitive with either domestically produced or imported oil and gas. Work month requirements will remain zero for the forseeable future.

CRITICAL THRESHOLDS

A critical threshold for tar sand resources would be any action that precluded or severely restricted, within the White Canyon STSA, surface use of drill rigs and processing equipment, which are required for tar sand exploration and development.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current levels of management will be adequate until interest in developing tar sand is expressed. There is a need to evaluate leasing categories prior to issuance of CHLs for tar sand development.

MANAGEMENT OPPORTUNITIES

Combined hydrocarbon leasing categories can be developed through the RMP process as an adjunct to development of oil and gas leasing categories.

ACEC POTENTIAL

No potential ACECs have been identified for the tar sand resource in the SJRA. The tar sand resource present is not believed to require special management to protect critical environmental concerns. The resource value of the in-place tar sand deposit does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Forty acres of the STSA are in existing oil and gas lease category 4 (closed to leasing) because of Dark Canyon Primitive Area. Thirty more acres are in category 3 (no surface occupancy) for desert bighorn sheep. These lease category restrictions could have a very minor effect on the leasing and development of the STSA as a whole if this tar sand deposit should become valuable.

DOCUMENTED PUBLIC CONTROVERSY

None.

4131 MINERAL MATERIAL

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Salable Minerals.

RESOURCE OVERVIEW

Salable minerals are present in most of the SJRA. Clay, building stone, topsoil, blow sand, decorative stone, petrified wood, and gravel are all salable commodities found within the resource area. The majority of these commodities are in abundant supply but are rarely in demand, and their primary function is as landscape and scenery. Sand and gravel applications make up 99 percent of the mineral materials workload for the resource area. The currently utilized deposits of sand, gravel, and clay are shown on the Salable Minerals overlay.

Materials of the salable mineral class have been in use in the SJRA since the time of the Anasazi Indians, when rectangular sandstone blocks were used as the principal building material for homes and storage structures. In more recent times and even today salable minerals are used in all roads and buildings constructed or maintained within the resource area.

The sand and gravel in the resource area come from two main sources: around the base of the Abajo Mountains and along the course of the San Juan River (cross-reference: Topography, Part I). Material originating on the Abajo Mountains is predominantly made up of igneous diorite cobbles in a sandy clay matrix. San Juan River cobbles are predominantly quartzite that has traveled from the San Juan Mountains in Colorado. The river material is very hard and of good quality, while the Abajo material is much softer and not adaptable to as wide a range of uses. In areas where neither of these sources of material is available, sandstones are excavated and crushed for a possible substitute (cross-reference: Geology, Part I).

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

The Mineral Materials Act of 1947.

The Multiple Surface Use Act gave the Department of Interior the authority to manage surface resources on mining claims

The Act of September 28, 1962 provided for disposal of petrified wood.

Mineral materials disposal regulations are found at 43 CFR 3600.

RESOURCE ALLOCATIONS

Mineral materials are allocated through sale or free use permit. These are in response to public demand and cannot be anticipated through the planning process.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

There are presently seven designated community pits for sand and gravel within the resource area, and there are plans to establish at least two more. The community pits were established to ensure a continuous supply of material in strategic geographic locations, where all conflicts with other resources have been resolved before material applications are received.

Actual sales, free use permits, and production of sand and gravel for 1983 and 1984 are shown in table 4131-1. Table 4131-2 compares sand and gravel production from private, state, and federal lands in San Juan County. Current information about active mineral material permits is available in the resource area files for sales and free use and on the microfiche record of outstanding cases supplied by the Denver Service Center, BLM. The locations of current material sales, material site rights-of-way, free use permits, building stone quarries, and community pits are shown on the Salable Minerals overlay.

There has been no recorded production of petrified wood, building stone, or topsoil from the resource area during FY 1983 and 1984, but approximately 6,000 cubic yards of clay and other fill material was produced during that time period. Some applications for purchase of building stone were rejected during those two years because of conflicts with mining claims. Disposals of all of these materials occur in the same manner as for sand and gravel: sales or free use permits to applicants. Small quantities of petrified wood (25 pounds per day, not to exceed 150 pounds per year) may be removed by individuals for personal use, free of charge and without a permit.

The Montezuma MFP, dated 1973, recorded a decision that no community pits should be established within the planning unit because of local opposition from contractors who were supplying material from private land. The South San Juan MFP (approved 1973) recorded a decision to establish community pits for public use in the Mexican Hat area.

SOCIOECONOMIC CONSIDERATIONS

San Juan County is the primary impact area for salable mineral activities within the SJRA. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County, on which the following discussion concentrates. For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

TABLE 4131-1

Recent Sand and Gravel Production Statistics
(cubic yards)

Year	Volumes of Sales Made	Sales Production	Volumes of Free Use Permits Issued	Production from Free Use Permits
1983	10,150	4,591	255,000	236,618
1984	60,400	21,118	615,000	220,850
Totals	70,550	25,709	870,000	457,468

TABLE 4131-2

Sand and Gravel Production From Federal and Nonfederal Lands
(cubic yards)

Year	Private Lands	State Lands	Federal Lands
1983	51,990	2,863	241,209
1984	52,700	7,202	241,968
Total	104,690	10,065	483,177

Most of the mining and quarrying of nonmetals employment is from sand and gravel production, and most of the sand and gravel production is associated with road construction and maintenance. Most of the jobs in this sector are held by county residents. Approximately 80 percent of the salable minerals production in the county is from public lands in the SJRA. Based on this percentage, approximately 27 jobs are directly related to salable mineral activity in the SJRA. Including indirect and induced effects, the salable mineral activities in the county generate 47 jobs and $1,090,700 of personal income. Salable mineral activities in the SJRA generate 38 jobs and $881,457 personal income (see table 4131-3).

Some of the governmental cost related to managing salable minerals within the SJRA also contributes to local sales, and therefore to income and employment. These local governmental expenditures generate an estimated 0.7 jobs and $10,215 of personal income (see table 4131-4).

In addition to the income and employment effects, salable mineral activity within San Juan County affects both the revenues and costs of local taxing jurisdictions. Related sales and property taxes and intergovernmental revenue sharing bring an estimated $1,300 to local taxing jurisdictions (see table 4131-5). Revenues generated from salable mineral activity in the SJRA bring 80 percent of the revenues generated from these activities throughout the county. These revenue figures are thought to be conservative, as they do not account for all related revenue sources.

Jurisdictional costs could not be delineated and quantified.

CONSISTENCY WITH NON-BUREAU PLANS

The USFS Final Environmental Statement and Land Use Plan for the Monticello Planning Unit, Manti-LaSal National Forest, was approved April 19, 1976. (A new forest plan is due out before MSA is final.) The USFS plan makes no provision for the disposal of mineral materials.

The NPS Mineral Management Plan for GCNRA was approved in March 1980. There is currently some question as to which agency manages the mineral material resources in the recreation area. The NPS has a policy against borrowing mineral materials from any park lands, including materials that would be used for development within a park. This places pressure on public lands to provide material for developments on park lands.

The NPS Resource Management Plan for CNP is due out in 1985. (Conflicts not analyzed yet.)

There are no published or draft plans for management of resources on the Navajo Indian reservation. Mineral materials disposals are not handled uniformly from case to case, and this makes material on the reservation an undependable source of supply, resulting in a demand for materials from public lands to be used in developments on the reservation.

TABLE 4131-3

Total Local Income and Employment Generated by Salable Mineral Activity in San Juan County and the SJRA (1982 1st quarter dollars)

Direct, Indirect, and Induced Effects

Industrial Sector	San Juan County			SJRA		
	Earnings[b] (dollars)	Employment (jobs)	Percent of Total	Earnings (dollars)	Employment (jobs)	% of Total
Farm	1,638	0.1	-	1,324	0.1	--
Private						
Mining	956,906	33.4	3.7	773,334	27.0	3.0
Construction	2,016	0.1	0.1	1,630	0.1	0.1
Manufacturing	28,145	2.0	1.6	22,746	1.6	1.3
Transportation & Utilities	6,357	0.4	0.2	5,138	0.3	0.2
Wholesale	12,806	0.6	0.5	10,349	0.5	0.4-0.6
Retail	36,434	3.7	1.2	29,445	3.0	1.0
F.I.R.E.[a]	6,768	0.4	1.2	5,470	0.3	1-1.2
Services	29,740	2.4	0.5	24,035	1.9	0.4-0.6
Government[c]	9,881	0.7	0.1	7,986	0.6	0.1
Proprietor's[b]		3.5	0.6		2.8	0.5
Total		47.3	1.2		38.2	1.0
Total Personal Income[b]	$1,090,691			$881,457		

[a] Finance, insurance, and real estate.

[b] Earnings include wage, salary and proprietor's income; personal income also includes dividends, interest, and rents, plus transfer payments and residential adjustments. Proprietor employment is not broken out by sector.

[c] Government sector figures only account for government enterprises such as the Post Office, and do not account for public administration.

Sources: USFS, 1982; BEA, 1984a; BEA, 1984b.

TABLE 4131-4

Local Importance of the SJRA Salable Mineral Program Related Costs (FY 1984, in 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Salable Minerals Program (dollars)	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	15,000	6,655	0.5
Other Sectors[a]		3,560	0.2
Total		10,215	0.7

[a] Includes the direct, indirect and induced effects of both government purchases of local goods and services, and the local expenditures by government employees.

Source: BLM Records; USFS, 1982.

TABLE 4131-5

Mineral Material Related Taxing District Revenues
(Calendar Year 1984 and Fiscal Year 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues Due to Mineral Material Activities in	
					San Juan Co.	SJRA
Taxes	$3,543,909	$ 582,906	$ 7,530,196	$11,657,011	$1,300	$1,000
Licenses & Permits	2,853	10,714		13,567		
Intergovernment	2,595,259	924,897	6,847,000	10,367 156		
Charges for Services	227,039	82,810	148,000	457,849		
Fines & Forfeitures	131,661	56,626		188,287		
Miscellaneous	970,241	285,855	447,880	1,703,916		
Total	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$1,300	$1,000

Note: Only taxes directly associated with the activity were asssessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue resources are expected to be minor, these effects were not quantified. Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Monticello, 1984; Smuin, Rich, and Marsing, 1984; Utah Foundation, 1985; Utah Tax Commission, 1985; and Yoakum, 1985.

DATA GAPS

An inventory of material sources available along major highways west of Comb Ridge and north of Monticello is needed for future planning and present demand.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

The mineral materials most commonly in demand are sand and gravel aggregate for road construction. Occasionally there is a request for sand to apply to icy roads; building stone; fill material; or sand and gravel to be used in concrete. The majority of the mineral materials disposed of in the SJRA go to the local county and state highway departments in the form of free use. In general, sales and permits are issued for the applicant's convenience at nearly any requested site, and there is a tendency for the requested site to be as near the use area as possible. To date this has created no insurmountable problems, but many old use sites were abandoned without rehabilitation.

Community pits have been designated to provide centrally located supplies of large quantities of material, principally for road construction and maintenance. Smaller outlying sites are used for short-term projects. The total number of use sites should be restricted to a manageable number (about 30) that will make the necessary material available at reasonably convenient locations without having a site established at every bend in the road.

Four work months were allocated to the mineral materials program for FY 1984 in the SJRA. This provided enough funding to meet the demand for sales and permits and to perform at least one inspection on all permits and community pits. About one work month was used in the establishment of new community pits during the year.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

The future demand for mineral materials is expected to remain about the same as it has been in recent years. Since only about 30 percent of the total volumes permitted or sold in the past 2 years (since 1983) have actually been produced, the existing material disposals should be adequate for current projects and maintenance of old projects. A steady flow of new applications, about ten per year, is expected for new projects, but this will be offset by the termination of some existing permits as current projects are completed. There is presently a sufficient supply of materials to meet the projected future demand.

The resource area should plan for the eventual need for material to resurface every paved road in the area, as well as for material to maintain and possibly upgrade existing unpaved roads. In some locations, particularly west of Comb Ridge and north of Monticello, there are insufficient known volumes of good grade material to resurface or maintain roads. Undocumented deposits may be available in the vicinity of highways U-95, U-261, and U-263 to meet this future need.

Funding for management of mineral materials is expected to be maintained at four work months per year, and that level would be adequate to respond to requests for permits throughout the year.

CRITICAL THRESHOLDS

There are both upper and lower limits to the number of active material use areas that should exist in the resource area, and these are critical thresholds in terms of meeting the demand for mineral materials.

A critical threshold for management of mineral material resources would be any action that could preclude disposal of mineral materials or severely restrict surface use over a total of 25 percent of the resource area.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current management of existing mineral materials areas is considered inadequate in one respect: adequate time has not been spent on compliance.

Ideally all sales, free use disposals, and community pits should be inspected no less than twice yearly for compliance with permit stipulations. More frequent inspections would be advisable on very active or short-term permits. To achieve this level of compliance inspections, the SJRA would have to commit more time than is now available. This is an administrative decision to be made outside the RMP process.

Current management results in an unavoidable and irretrievable commitment of mineral resources.

Mineral material sites that have been designated as community pits have, to a certain extent, been committed to that use. This commitment is irreversible and irretrievable insofar as the material within the designated pits has been permitted or sold. The community pit designation itself is subject to removal as management goals change, and the removal of a designation would remove the commitment of the materials within the pit.

Other material sales and permits do present an irreversible and irretrievable commitment of resources. Ownership of the total volume of material sold has passed from the Federal Government. Under free use permits, the total volume permitted is committed for the term of the permit, although actual material ownership stays with the Federal Government until the material is actually removed from the site.

Current handling of sales and permits is considered adequate.

MANAGEMENT OPPORTUNITIES

There are quite a number of old mineral material excavations on public lands within the resource area that are no longer used and are unreclaimed. They resulted from both authorized and unauthorized uses and are now depleted, no longer necessary, or covered by mining claims. Long-range planning could include some of these sites in future projects and bring about their eventual rehabilitation. This could be done at the activity plan level or as part of an administrative action. It is too site-specific to be included as an alternative in the RMP process.

A demand has been demonstrated for material from both the Bluff and Zeke's Hole vicinities. Both of these locations are presently under mining claims. The establishment of community pits at both locations would be possible to protect the gravel deposits from encumbrance from subsequent mining claims; these sites are shown as proposed community pits on the Salable Minerals overlay. This is a site-specific action and would not be accomplished through the RMP.

ACEC POTENTIAL

No potential ACECs have been identified for salable mineral materials in the resource area. The mineral materials resource is not believed to require special management to protect critical environmental concerns. The resource value of the in-place mineral materials deposit does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

The Interim Management Plan for the Grand Gulch Plateau identifies a large area (434,000 acres) between Butler Wash and the Red House Cliffs that is to be managed to maintain its natural scenic quality. The extraction of suitable road maintenance or construction materials is not one of the uses discussed in the interim plan, although portions of highways U-95, U-261, U-263, and U.S.-191 all serve parts of the proposed management area. Some avenue should be left open to supply material for use on these primarily recreational roads. Investigation areas for this purpose have been identified on the Salable Minerals overlay.

Mineral material disposals are subject to restrictions from conflicts with archaeology and visual resources management throughout the resource area. Every material site is required to have a cultural resource clearance before a disposal can be made, and the placement of material use sites is limited by the compatibility of that use with the visual quality of the surrounding area. These factors add two tests that a prospective site must meet before a disposal can be made.

Some areas that are valuable for their gravel deposits are also covered by placer or lode mining claims, and the mining laws do not allow the disposal of mineral materials from the surface of a mining claim. Validity examinations can be performed where there is an identified need from a conflicting land use for the surface of the claim, but if the claim is found to be supported by a discovery of valuable minerals and is procedurally valid, no mineral material disposal can be made from the claim. This conflict cannot be resolved without a change in the mineral laws.

DOCUMENTED PUBLIC CONTROVERSY

There has been some public controversy over whether community pits should be established in parts of the resource area. The Montezuma MFP in 1973 recorded opposition to establishment of community pits. During 1984 an EA (UT-069-84-53) concerning the establishment of community pits in the Montezuma Planning Unit was advertised for public comment. Several letters were received which opposed the proposal and expressed a desire to keep the Federal Government out of the mineral material market. The EA was approved with a finding that the establishment of community pits was necessary to provide a long-range material supply. It was also decided that making sales to individuals and contractors would not be unfair to local contractors, because BLM is required to receive fair market value for all disposals of mineral materials.

4132 MINING LAW ADMINISTRATION

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Locatable Minerals.

RESOURCE OVERVIEW

Uranium/vanadium and gold are the locatable minerals most frequently claimed within San Juan County. In the past, several mines were developed for copper production, but their ore was rejected because the uranium content was too high for the copper to be economically extractible (Thaden, et al.,1964) Established uranium mining districts and favorable strata for uranium and gold occurrence are shown on the Locatable Minerals overlay.

At about the same time (1948) the Federal Government began a program to encourage exploration for uranium for national defense program research. A localized mining boom resulted and lasted until about 1962. Little uranium activity occurred until late 1965 when nuclear power plants began to be planned and built across the nation, and a new market for the metal emerged (Doelling, 1969). Nuclear power has since fallen into public disfavor, causing the cancellation of many plans for nuclear plants and killing the domestic uranium market. Uranium yellowcake has gone from a record high price of $42 per pound in 1980 to $16 per pound in late 1984 (Engineering and Mining Journal, November 1984).

The principal hosts for uranium in the resource area are the Morrison Formation and the Chinle Shale (Doelling, 1969) (cross-reference: Geology, Part I). Uranium shows have also been found in the Cutler Formation within the SJRA, but it is not considered to be a significant host. The Morrison is of Jurassic age, and it is presently near the surface (within 500 feet) over roughly the eastern third of the resource area. The older Chinle Shale is of Triassic age, and exposures of Chinle are most frequent in the western and northern portions of the resource area. The Chinle is present in two-thirds of the resource area, but is seldom near the surface. Uranium properties have thus far been developed only where surface exposures of favorable formations occur, such as in canyon walls or on cliff faces. The largest historical production has been from Lisbon Valley, White Canyon, Deer Flat, and Montezuma Creek (Doelling, 1969). Known uranium mines and surface exposures of the Morrison and Chinle Formations are shown on the Mineral Resource Inventory maps in the resource area files. Uranium mining districts are shown on the Locatable Mineral Overlay.

Gold in San Juan County is found principally in gravel terraces along the San Juan and Colorado Rivers and in pediment deposits on the flanks of the Abajo Mountains (cross-reference: Topography, Part I). Mining claims located for gold in the SJRA are placer claims. There has been interest in gold, particularly along the river, since 1892 (Baars, 1973). In the last 3 to 4 years (since 1980), there has been renewed interest in gold along the San Juan River, with new mining claims located and some actual testing for gold. The Colorado River deposits fall within GCNRA and CNP adjacent to the resource area.

MANDATES AND AUTHORITIES FOR USE AND PROTECTION

Federal Laws

The Act of May 10, 1872 (the General Mining Law of 1872).

The Act of July 23, 1955 (the Multiple Surface Use Act of 1955) gave the Department of the Interior the means to manage surface resources on mining claims.

The Act of August 11, 1955 (the Mining Claims Rights Restoration Act of 1955) opened powersite withdrawals to mining claim location.

Sections 102 and 314 of FLPMA outline management to prevent unnecessary and undue degradation and require recordation of mining claims and assessment with BLM.

An Act to establish GCNRA provided requirements for minerals disposal on GCNRA lands.

Regulations

43 CFR 3800: Mining Claims Under the General Mining Laws.

RESOURCE ALLOCATIONS

Locatable minerals are allocated through location of mining claims. Prospecting or exploration can take place without a claim, although an unclaimed discovery would be pre-empted by location of a claim.

By law, all public lands are open to mineral entry (mining claim location) unless specifically segregated or withdrawn. These allocations are made at the Departmental level, but may be in response to a recommendation originating at the resource area level.

A segregation is made in response to an application for certain forms of land disposal on a case-by-case basis (cross-reference: Non-Energy Realty, Part II) (see 43 CFR 2440). The purpose of a segregation from mineral entry, if applied, would be to prevent new mining claim locations from clouding title to the lands which are to be classified for disposal or use for a specified purpose. A mining claim carries an inherent right to carry to surface patent. If a new claim were located and a surface patent ensued, it would encumber the classified disposal action. This type of allocation is generally in small, scattered tracts and cannot be anticipated through the planning process.

Withdrawals of land from appropriation under the mining laws are governed by Section 204 of FLPMA. Withdrawals of public lands can be made only by the Secretary or by Congress. A withdrawal generally covers a large area of land set aside for a specific purpose, such as CNP. The land is withdrawn from mineral entry to protect certain resource values from the effects of mining or to prevent the land from passing from federal ownership through patent. While it is beyond the discretion of the Area Manager to make withdrawals, the RMP can serve as a basis for recommendations from the resource area through administrative channels that lands be withdrawn from mineral entry.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

There are approximately 50,000 unpatented mining claims within the SJRA, although claims are continuously being located or abandoned. Current information about mining claims can be found on the BLM microfiche produced by the USO and available in the District and SJRA offices. Information about individuals and companies active in mineral exploration and production can be found in the resource area mining files.

Because mining claimants have the right to prospect for locatable minerals and locate mining claims without governmental approval, BLM's management is minimal. Mining claim recordation and adjudication are handled at the USO level, and the resource area is not involved. Appeals of adjudication are heard by the IBLA without resource area involvement. Resource area personnel process notices of intent to perform annual assessment, and perform field checks of assessment operations and reclamation. Before a claimant could begin mining, resource area personnel would be involved in approving a plan of operations. Resource area personnel would be involved in validity examinations if a claimant applied to take a claim to patent.

Mining claims on the Manti-LaSal National Forest are managed by the USFS in much the same way as they are managed by BLM on public lands. BLM's USO handles recordation of mining claims located on USFS lands, and the DOI has paramount responsibility for these claims. The USFS processes notices of intent and plans of operation for mining or exploration on mining claims and initiates any contest complaints against the claims (36 CFR 228). The IBLA hears appeals by mining claimants as a result of either BLM adjudication or USFS contest against a claim. The SJRA has essentially no involvement in the management of mining claims that have been located on USFS lands.

CNP has been withdrawn from mineral entry, and there are presently no mining claims located within the park. Claims in existence at the time the park was established (1964) have been either dropped by the claimants or invalidated through court proceedings. Access to mining claims that lie outside the park can be obtained through the park only on designated roads, on foot, or on pack animals.

GCNRA presently has no mining claims. The act that established the recreation area made all mineral commodities leasable, with leases to be administered by the BLM. Applications for mineral leases would be submitted to BLM and would be issued according to the recommendation of the NPS, the surface mangement agency. NPS is responsible for assessing whether the mineral leasing and development applied for is compatible with park purposes and for providing stipulations for operations under the lease. In late 1984 no lease applications for locatable minerals are pending, and none have been issued.

Locatable minerals on the Navajo Indian reservation are leased by the BIA where the minerals belong to the Indians. Federal minerals under reservation surface are managed by BLM in the same way as they are managed on public lands, with the addition of BIA concurrence. This work would be charged to 4133 Mineral Leasing (cross-reference: Mineral Leasing, Part II).

The DOE has withdrawn a 50-acre tract from mineral entry to manage uranium for research purposes. This allows DOE to lease the locatable minerals to private concerns. BLM is not involved in management of these leases (cross-reference: Energy Realty, Part II).

IMP governs mining claim activity within WSAs and ISAs. Prospecting and mining claim development within a WSA must either be nonimpairing, be a grandfathered use of the area, or be a valid existing right on the land (as for mining claims located prior to the passage of FLPMA in 1976).

The four existing MFPs encourage exploration for and development of locatable minerals, but do not give specific management objectives for this use in any area.

SOCIOECONOMIC CONSIDERATIONS

San Juan County is the primary impact area for locatable minerals activities within the SJRA. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County, on which the following discussion concentrates.

For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

Uranium/vanadium mining and milling is the major locatable mineral activity in San Juan County, and has historically been one of the county's major employers (see table 4132-1). The last peak in uranium production was in 1980, and by 1983 there were 500 fewer jobs in the uranium/vanadium industry, a 62 percent drop (UDES, 1985). This drop can be attributed to declining prices for uranium products, which have made all but the least expensive, highest concentrate ore uneconomical to mine. Currently 300 jobs can be attributed to uranium/vanadium mining and milling in San Juan County (8 percent of county employment). The indirect and induced effects of these jobs account for another 122 jobs (4 percent of county employment and $4,304,334 of personal income (4 percent of county income) in San Juan County (see table 4132-2). Many of the jobs directly attributable to uranium/vanadium mining and milling are held by residents of Grand County.

TABLE 4132-1

San Juan County's Locatable Mining Employment (by Place of Employment)

Mining Sector	1981 Employment (jobs)	1983 Employment (jobs)	Approximate % in the SJRA (1983)
Metal Mining			
Gold & Silver Ore	10	10	0.3
Metal Mining Services	5	10	0.3
Uranium/Vanadium Ores	807	304	9.6
TOTAL	813-822	306-324	9.7-10.3

Sources: UDES, 1985; UDES, 1982; BEA, 1984a; BEA, 1984b.

TABLE 4132-2

Total Local Income and Employment Generated by Uranium/Vanadium Activity in San Juan County
(1984 first quarter dollars)

	Direct, Indirect, and Induced Effects					
	San Juan County			SJRA		
Industrial Sector	Earnings [b]	Employment	Percent of Total	Earnings	Employment	Percent of Total
Farm	6,617	0.5	0.4			
Private						
Mining	8,887,613	310.3	36	586,431	20.5	2.4
Construction	27,715	1.7	1.6	1,829	0.1	0.1
Manufacturing	183,386	12.9	10.3	12,100	0.9	0.7
Transportation & Utilities	77,067	4.5	2.4	5,085	0.3	0.2
Wholesale	155,235	7.5	5-10	10,243	0.5	0.3
Retail Trade	288,561	29.4	9.4	19,040	1.9	0.6
F.I.R.E.[a]	105,751	5.8	15-20	6,978	0.4	1.0
Services	320,045	25.3	6.4	21,118	1.7	0.4
Other						
Government[c]	47,916	3.6	0.4	3,161	0.2	0.0
Proprietor's[b]		30.8	6		2.0	0.4
Total	10,993,289	432.3	11.1	725,370	28.5	0.7
Total Personal Income	13,191,947			870,444		

Note: Many of those working in San Juan County's uranium industry reside in Grand County. The direct, indirect, and induced importance of the uranium industry to San Juan County residents is therefore overstated.

[a] Finance, insurance, and real estate.

[b] Earnings include wage, salary, and proprietor's income; personal income includes dividends interest and rent. Proprietor numbers are not broken out by sector.

[c] Government sector figures only accounts for government enterprises such as the Post Office and do not account for public administration.

Source: UDES, 1985; USFS, 1982; BEA, 1984a; BEA, 1984b.

Although there has been significant uranium/vanadium mining in the county, currently there is no such activity in the SJRA, and there has been no such activity since 1982. The only uranium/vanadium activities having local economic effects are expenditures associated with exploring and developing mining claims.

Gold exploration and production is and has always been a minor industry in San Juan County (see table 4132-1). The industry accounts for fewer than 10 jobs, all of which can be attributed to mining within the SJRA.

There are approximately 50,000 mining claims on public lands in the SJRA. If the statutory minimum of $100 per year of assessment work was completed for all 50,000 claims, a minimum of $5,000,000 was spent to assess and develop mining claims in the SJRA in 1984. However, during 1984 only 17 notices and 2 plans covering 601 claims have been submitted to the SJRA. All surface disturbing assessment work requires either a notice or plan (43 CFR 3802 and 3809). The type of assessment work which does not require surface disturbance is allowed for only 2 years. Most assessment work could therefore be expected to involve some surface disturbance. The large discrepancy between the number of claims and the claims covered in the submitted notices or plans implies that most assessment work is a paper exercise with no associated economic output or transaction, although it is possible that some operators conduct assessment without submitting the proper notices. Based solely on the notices and plans received, which ignores some non-surface disturbing expenditures, approximately $480,000 was spent on assessment work in the SJRA. These local expenditures, including their direct, indirect, and induced effects, generate 14.2 jobs and $252,874 personal income earned in the county.

Some of the governmental cost related to managing locatable minerals within the SJRA also contributes to local sales, and therefore to income and employment. These local governmental expenditures generate an estimated 0.7 jobs and $10,000 of personal income (see table 4132-3).

In addition to the income and employment effects, locatable mineral activity within San Juan County affects both the revenues and costs of local taxing jurisdictions. Related sales, property taxes, and intergovernmental revenue sharing bring an estimated $1,510,000 to local taxing jurisdictions (see table 4132-4). Only a small portion of these revenues are from activities on public lands within the SJRA. These revenue figures are thought to be conservative, as they do not account for all related revenue sources.

Jurisdictional costs could not be delineated and quantified.

CONSISTENCY WITH NON-BUREAU PLANS

The USFS Final Environmental Statement and Land Use Plan for the Monticello Planning Unit, Manti-LaSal National Forest, was approved April 17, 1976. (A new forest plan is due out before the MSA is final). Under USFS management, mining exploration is treated in the same manner as exploration on public lands.

TABLE 4132-3

Local Importance of the SJRA Locatable Mineral Program Related Costs (FY 1984, in 1982 first quarter dollars)

SIC Sector	Estimated Cost of the Program (dollars)	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	20,000	10,675	0.6
Other Sectors[a]		3,558	0.2
Total		14,233	0.7

[a] Includes the direct, indirect, and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

Source: BLM Records; USFS, 1982.

TABLE 4132-4

Locatable Mineral Related Taxing District Revenues
(Calendar Year 1984 and FY 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues Due to Locatable Mineral Activities in San Juan Co.	SJRA
Taxes	$3,543,909	$ 582,906	$ 7,530,196	$11,657,011	$1,510,000	$ 0
Licenses & Permits	2,853	10,714		13,567		
Intergovernment	2,595,259	924,897	6,847,000	10,367 156		
Charges for Services	227,039	82,810	148,000	457,849		
Fines & Forfeitures	131,661	56,626		188,287		
Miscellaneous	970,241	285,855	447,880	1,703,916		
Totals	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$1,510,000	$ 0

Note: Only taxes directly associated with the activity were asssessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue resources are expected to be minor, these effects were not quantified. Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetary District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Monticello, 1984; Smuin, Rich, and Marsing, 1984; Utah Foundation, 1985; Utah Tax Commission, 1985; and Yoakum, 1985.

The NPS General Management Plan for GCNRA was approved November 21, 1979. It established four management zones with varying limitations on mineral disposal.

The NPS Mineral Management Plan for GCNRA was approved in March 1980. Locatable minerals under the Glen Canyon Plan can be leased to applicants after the effects of leasing and development of the application area have been analyzed.

The NPS Resource Management Plan for Canyonlands National Park is due out in 1985. (Conflicts not yet analyzed).

No management plans have been published for locatable minerals management on the Navajo Indian reservation.

DATA GAPS

None identified.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

Exploration for and production of locatable minerals is on a downward slide for uranium and vanadium, and on an upward turn for the development of gold claims. Both trends are directly related to economics. A persistent poor mining economy has eliminated much of the speculative value of uranium claims, and has provided a break in once-frenzied exploration activity in this area.

The demand for domestically produced uranium is presently very low. Production has been decreasing nationwide since about 1980, when the price for yellowcake began to fall, and the activity in San Juan County has followed the national trend. There is still exploration on public lands by companies and individuals who are performing annual assessment work to maintain blocks of mining claims located for uranium, or who are responding to foreign markets. The number of notices of exploration has fallen from a high of 59 in 1981 to 17 in 1984; up to 25 notices per year is a manageable number of actions for the resource area with the present staff.

The market for gold is subject to wide fluctuations, but in general retains a fairly high value compared to uranium: $343.10 per ounce as compared to $16 per pound for uranium yellowcake (The Wall Street Journal, November 1984). In recent years the price of gold has ranged as high as $825 per ounce in January of 1980, and a lot of gold properties considered marginal at $400 per ounce were attractive prospects at the higher price. The placer gold deposits in the resource area are limited to the northern bank of the San Juan River and along Johnson and Recapture Creeks, so there is a limited capability for the resource area to meet the demand for gold production.

At the present time the process for extracting the placer gold found in the resource area is still in the experimental stages. The gold along the San Juan River is very fine and cannot be removed in quantity by conventional methods (Baars, 1973). The majority of gold claims seem to be held for their speculative value. Only one claimant was actively working on claims located for gold as of fall 1984.

The resource area was allocated 6 work months for locatable mineral management in FY 1984. This was about one work month too much for the resource area, as long as the uranium demand remains at or near the present low level. Most of the workload in the locatable minerals program is in field checks of current and past activities, and a 25 percent increase in exploration activity would significantly increase the amount of field time needed.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

There should be a fairly constant future demand for gold, and there is an anticipated recurrence of demand for uranium, though not thought to be significant before 2000. Price is the main factor affecting demand for the metals. Demand for domestic uranium reserves will depend to a certain extent on the acceptance of nuclear power by the American public.

It is anticipated that in time, perhaps about the turn of the century, the demand for uranium will begin to grow again in response to a demand for energy produced by nuclear reactors. At that time there would be a resumption of exploration and production of the high grade deposits found in this area. Even though demand is currently very low, uranium resources should be left available for future development.

Uranium reserves within the SJRA are ample to meet future demand. Gold reserves are somewhat limited, even if a workable process for extraction of fine gold is developed.

Work month requirements for the locatable mineral program will remain at 5 per year until all of the past activity from the late 1970s boom period has been rehabilitated, perhaps 2 or 3 more years (until 1988). At that time the workload will decrease to approximately 50 old actions and 20 new actions to monitor per year, and the work month requirement could drop to 4 per year. Any substantial increase in the number of notices and plans submitted would naturally increase the workload.

CRITICAL THRESHOLDS

Twenty-five notices represents a critical threshold as the number of surface disturbing activities that can be effectively monitored during the summer field season. A critical threshold for management of locatable mineral resources would be any action that would preclude claim location or severely restrict surface use over a total of 25 percent of the resource area.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current management results in an unavoidable, irreversible, and irretrievable commitment of mineral resources.

Mining claims themselves represent an irreversible and irretrievable commitment of resources for as long as a mining claimant retains an interest in the claims by meeting the filing and assessment requirements. The claimant has an inherent right to explore for and remove mineral commodities and to patent the surface if the claim can meet the patent requirements.

MANAGEMENT OPPORTUNITIES

The SJRA can work toward the eventual rehabilitation of some old, abandoned uranium workings, particularly if they are associated with currently ongoing projects. Mining claimants who are waiting for a price recovery to resume mining would consider many of the old workings to be only temporarily abandoned. This opportunity can be realized at an administrative level in response to site-specific proposals, and is not dependent upon the RMP process.

Areas where conflicts are identified between mining of locatable minerals and other surface resource values can be withdrawn or segreated from mineral entry. Segregations are made by Departmental order, but can be recommended to resolve resource management conflicts identified in the RMP. Withdrawals cannot be made through the RMP, but the RMP can serve to identify areas where withdrawal would be in the best national interest and to recommend withdrawal of these areas. The RMP can also serve to identify areas where it is in the best national interest not to withdraw or segregate locatable minerals from entry.

ACEC POTENTIAL

No potential ACECs have been identified for locatable minerals in the SJRA. The locatable mineral resource is not believed to require special management to protect critical environmental concerns. The resource value of the in-place locatable mineral deposit does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Exploration for locatable minerals is somewhat hampered by the necessity to avoid cultural resources. Current management requires that all cultural sites be avoided, because the Federal Government cannot afford to pay for mitigation. No serious conflicts have arisen between cultural sites and chosen exploration sites so far, but there could at any time be a drill site that an exploration company feels cannot be moved to avoid archaeological sites.

Exploration for uranium within Squaw Canyon WSA in 1983 was hindered because of IMP. Because of IMP, the owner of the locatable mineral interest within the WSA arranged to perform yearly assessment work on a portion of the claim block that extended outside the WSA boundary. IMP has effectively closed the WSA to further evaluation of the mining properties that would cause surface disturbances within the boundaries of the WSA. If the Squaw Canyon area were not under IMP, the mineral owner would be free to cause reasonable surface disturbance in order to evaluate the existing mining properties.

Yearly uranium exploration activity has taken place within dropped portions of the Cheesebox Canyon inventory unit for 1980 through 1984. These areas were not included in the final WSA boundaries, but operations were conducted under IMP until 1983. Although no activity has been stopped because of IMP, these actions are scrutinized more closely than usual to make sure none of the activity crosses into the WSA.

Mining claim access and uranium claim development in 1976 and 1977 on the Mancos Mesa WSA resulted in an impairment of wilderness values. The activity occurred before publication of either the BLM's wilderness inventory guidelines or IMP requirements.

No other WSAs within the SJRA have had mining claim assessment or development operations under IMP.

DOCUMENTED PUBLIC CONTROVERSY

None.

4133 MINERAL LEASING

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Potash Favorability Map.

RESOURCE OVERVIEW

This BLM program covers nonenergy leasable minerals and uranium leasing on acquired lands and Indian lands. Within the SJRA, the only nonenergy leasable mineral present in significant quantities is potash. The following discussion will be limited to potash management.

Bedded potash deposits exist over the eastern portion of the SJRA in the Paradox Formation of Pennsylvanian age (cross-reference: Geology, Part I). However, there are no leases or prospecting permits for potash, and there has been no production of potash and no exploration specifically for potash resources in the SJRA.

During Pennsylvanian time, downwarping of the Paradox Basin accompanied the adjacent Uncompahgre Uplift. The Paradox Formation originated in this slowly subsiding, northwest-trending marine basin (Paradox Basin) that existed in southeastern Utah and southwestern Colorado 300 million years ago (cross-reference: Oil and Gas Leasing, Part II). Periodically, ocean waters were cut off from those in the basin due to tectonic activity associated with the Uncompahgre Uplift. Evaporation rates were high enough to cause concentration and deposition of halite, potash, anhydrite, and other less common saline materials. The cumulative thickness of the evaporitic rocks may have been about 7,000 feet, but lateral and vertical flowage of the salt after it was deposited has resulted in thicknesses of up to 14,000 feet in some of the region's salt anticlines (Hite, 1961; Ritzma, 1969).

Based on well data from petroleum exploration, 29 cycles of deposition are recognized in the Paradox Formation. Each complete cycle of deposition contains black, organic-rich shale, limestone, dolomite, anhydrite, halite, and potash. However, not all cycles went to completion; of the 29 cycles, only 18 are known to contain potash, and only 11 are potentially exploitable. Within the evaporite cycles, both the average thickness of potash horizons and the ratio of potash to total salts increase progressively northeastward toward the Uncompahgre Uplift (Hite, 1964; Dames and Moore, 1978).

Over much of the Paradox Basin, potash deposits occur at depths of more than 5,000 feet, which are prohibitive for exploitation. Potash deposits are thickest and nearest to the surface along a series of northwest-trending anticlines within a structural zone about 100 miles long and 30 miles wide in Utah and Colorado, along the northeastern portion of the Paradox Basin.

Therefore, areas encompassing these anticlines are the most favorable for potash occurrence and mining (Hite, 1961; Dames and Moore, 1978).

The potential for occurrence of potash in the SJRA is shown on the Potash Favorability overlay. The KPLAs have a high favorability for potash occurrence (see the sections on resource allocations and current managment practices and planning guidance in this chapter). All of the SJRA east of the edge of known potash deposition in the Paradox Basin has a moderate favorability for potash occurrence. Criteria used to determine potash favorability are given in Appendix 4133-A at the end of this chapter.

Due to the depth and undulating nature of potash deposits in the Paradox Basin, solution mining is the most likely method of development. In this method, water is injected to induce solution of potash. The solution is then circulated to the surface and the potash is precipitated out of the solution. The quantity of water needed to produce a potash-rich solution is very large for a commercial operation. The only producing potash mine in the Paradox Basin is Texas Gulf's solution mine in Grand County near Moab, which requires up to 3,000 gallons of water per minute.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

The Act of February 25, 1920, as amended (the Mineral Leasing Act);
The Act of February 7, 1927 (the Potash Leasing Act);
BLM Mineral Resources Policy; and
Regulations found at 43 CFR 3500

RESOURCE ALLOCATIONS

Potash is allocated through a potash lease. A lease may be issued either within or outside of a KPLA. Exploration may be done outside a KPLA under a prospecting permit. If commercial quantities of potash are discovered, a preference right lease is issued.

BLM would define a KPLA where there is evidence that the presence of a commercially workable potash deposit can be established without prospecting. Within a KPLA, competitive leases must be issued. The KPLA evaluation is based on geologic information and data from drilling and mining. Within the SJRA, data are available for certain scattered areas, principally from well logs, and are not available for the remainder of the area. Lack of budget and staffing, along with lack of interest in potash leasing, has delayed evaluation of available data to determine if areas do or do not qualify as KPLAs. The BLM Moab District Minerals Division anticipates that such an effort will get underway within the next 5 years, prior to 1990. Any KPLAs determined will be taken into account during the periodic review of the RMP.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Potash is not now actively managed within the SJRA. Although the mineral resource is present, there is no indication of industry interest in potash development.

The Lisbon Valley and Cane Creek anticlines occur partially in the north and northeastern portions of the SJRA respectively. These structures were established by the USGS as KPLAs in 1960. Establishment of the Lisbon Valley KPLA was based on data obtained from a number of petroleum wells. The Cane Creek KPLA was established based primarily on Texas Gulf's Cane Creek Mine, which was opened as a conventional underground potash mine in 1954. It was converted to a solution mine in 1970 due to the structural complexity of the potash deposits and is still operating at the present time . Current production is 200,000 tons of potash per year (Searles, 1980).

There has not been a conflict between potash management and IMP in the resource area. Potash exploration or production activities were not ongoing in any WSA or ISA at the time FLPMA was passed, so they are not grandfathered uses; no potash activities have occurred in these areas under IMP.

Current planning is silent on potash management. The Indian Creek-Dry Valley MFP mentioned potash, but deferred preparation or consideration of management objectives.

SOCIOECONOMIC CONSIDERATIONS

There is no current (1985) exploration, development, or leasing for potash within the SJRA; therefore, no social or economic considerations have been identified.

CONSISTENCY WITH NON-BUREAU PLANS

Potash management is not addressed in formal land management plans in effect for other agencies within the resource area.

DATA GAPS

The actual extent of potash resources in the SJRA has not been evaluated. In places, data are available from oil and gas well logs or other deep drilling tests, but the area outside the KPLAs has not been evaluated.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

No potash is presently being produced in the SJRA, and the demand for potash from the Paradox Basin is considered low. Potash is currently being produced in Utah by solution mining at the Texas Gulf Cane Creek Mine near Moab and from saline brines in and around the Great Salt Lake. Existing potash production capacity at these locations is adequate to satisfy demand for the commodity throughout the Mountain States region for at least the next 10 to 20 years (Dames and Moore, 1978).

No work months have been allocated to the SJRA for a potash program during the past 5 years (since 1980).

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

Canadian potash currently dominates the North American potash market, largely due to governmental preferential tax treatment and transportation subsidies. With the existing economic and political climate, Canada will also be the likely source of increased production capacity needed to satisfy expanded future demand. However, a change in these conditions could position Utah to become a major new potash supply source in the United States (Dames and Moore, 1978). Within this scenario it is possible that there could be a future demand for potash produced from the SJRA. However, the issuance of leases and prospecting permits in 1984 for potash within the Grand Resource Area to the north, coupled with the current (1985) production and expansion potential of the Texas Gulf mine and a solution mine proposed by Buttes Resources, both in Grand County, make it less likely that a market for production of potash from the SJRA would develop. Accordingly, it is thought to be unlikely that there will be commercial interest in potash leases within the SJRA before the year 2000.

If interest in potash leasing is expressed, or if the BLM determines that the economic viability of potash resources present would support development of potash within the SJRA, the BLM would initiate a planning amendment or revision to the RMP, if necessary. This would also serve to define special stipulations or conditions, if any, required for the lease, if not already addressed in the RMP.

CRITICAL THRESHOLDS

A critical threshold for potash resources would be any action that precluded or severely restricted, within the Lisbon Valley or Cane Creek KPLAs, surface use of drill rigs, evaporation ponds, and processing plants, which are required for potash exploration and development.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current levels of management will be adequate until interest is expressed in developing potash resources.

MANAGEMENT OPPORTUNITIES

It is possible that other areas in the SJRA could qualify as KPLAs. Data are lacking for most of the resource area, and have not been evaluated where present. The presence of additional KPLAs is not expected to increase or decrease interest in potash leasing in the resource area. These designations may be made independently of the RMP process.

The RMP could be used to develop special stipulations or conditions to be included in a minerals lease. The RMP could also be used to identify areas where minerals leasing would not be in the national interest, due to conflicts with other resource values.

ACEC POTENTIAL

No potential ACECs have been identified for potash in the SJRA. The potash resource is not believed to require special management to protect critical environmental concerns. The resource value of the in-place potash resource does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

None identified.

DOCUMENTED PUBLIC CONTROVERSY

None.

APPENDIX 4133-A

Specific Criteria Used to Derive Levels of Favorability and Certainty for Potash Resources

GENERAL

Potassium (or "potash," K_2O) is a vital chemical element used to promote plant growth and increase crop yield. About 95 percent of the potash consumed in the United States is used in fertilizers.

Most potash is obtained from bedded deposits by underground mining. Where the deposits are too deep, generally more than 3,000 or 4,000 feet below the surface, solution mining methods are used. Smaller amounts of potash are also derived from evaporation of salt lakes and from subsurface brines.

Potassium occurs in igneous, metamorphic, and sedimentary rocks. About 95 percent of potash reserves, however, are contained in bedded sedimentary deposits of various geologic ages that originated from evaporation of restricted bodies of sea water. The potassium is contained largely in the mineral sylvite (KCl), and in other potassium-magnesium minerals, that occur in tabular bodies a few tens of feet thick covering several square miles (Smith and other, 1973; USGS Professional Paper 820). The other 5 percent of potash reserves are contained in natural brines that originated largely by evaporation of Pleistocene lakes. Potash reserves of both the world and North American are enormous.

Favorability--The favorability of a geologic environment for potash is based on the identification of paleo-evaporitic basins. Of the 69 evaporite deposits (basins) identified in the United States by Smith and others (1973; USGS Professional Paper 820), only 7 are known to contain potassium minerals. The scarcity of potash in evaporitic basins is the result of the order in which minerals are precipitated from sea water. In general, potash minerals precipitate only after extreme evaporation, and always within the sodium-rich (halite) facies of an evaporite sequence. Thus, in the most favorable geologic environments for potash, a suitable paleo-topography and paleo-climate that tend to favor extreme evaporation, barred basins, and characteristic sediments (halite, gypsum, anhydrite, etc.) should be identifiable.

The tonnage of potash assigned to the various favorability levels listed below come from Guild (1981, Preliminary metallogenic map of North America: U.S. Geological Survey).

Certainty--The degree of certainty that potash occurs in a WSA is based on the proximity, type, and abundance of direct evidence that either supports or refutes the existence of potash within the WSA. The following data can be used to support the various certainty levels: (1) the reported occurrence of potash from oil and gas exploration, and (2) active or once-productive mines.

FAVORABILITY

f1: WSAs assigned to the "f1" category are unfavorable for potash. None of the geologic characteristics that are normally associated with bedded potash deposits, such as a paleo-evaporitic basin, can be identified within the WSA.

f2: WSAs assigned an "f2" rating are within a marginally favorable geologic environment for potash. Although the WSA will contain some rocks that originated in an evaporitic environment, the geologic data suggest that the climate within the basin was not paricularly arid, or long-lived. If, on the other hand, a large paleo-evaporitic basin is believed to have existed in the region, geologic data suggest that the WSA lies along the basin's periphery. If deposits occur in this environment, they will generally contain less than about 1,000,000 tons of potash.

f3: WSAs assigned an "f3" rating are within a moderately favorable geologic environment for potash. The WSA will contain some evaporite deposits such as halite and gypsum, and the geologic data suggest that the climate within the basin was sufficiently arid and long-lived so that widespread, moderately thick beds of relatively pure potash accumulated. If deposits occur in this environment, they will generally contain between 1,000,000 and 10,000,000 tons of potash.

f4: WSAs assigned an "f4" rating are within a highly favorable geologic environment for potash. The WSA will contain evaporite deposits such as halite and gypsum, and the geologic data suggest that the climate and topography within the basin was sufficiently arid and long-lived so that widespread, thick beds of very pure potash accumulated. If deposits occur in this environment, they will generally contain more than 10,000,000 tons of potash.

CERTAINTY

c1: In the lowest level of certainty, "c1", no direct data are available to support or refute the occurrence of potash within the WSA, regardless of the level of geologic favorability. No beds of potash-bearing rocks are known from the region surrounding the WSA, nor can any be reasonably inferred to exist in the WSA based on lateral continuity with known potash-bearing rocks at great distances from the WSA. Accordingly, the WSA will be far removed from an established or prospective evaporite basin.

c2: A c2 certainty level for potash again implies that no direct data occur within or very near the WSA being evaluated (data such as exploratory oil and gas wells, exploratory drill-tests, or former mines and prospects). Some data must be available from the vicinity of the WSA, and the intervening geology must be such that an inference of continuty between these known occurrences and the WSA is reasonable. Accordingly, a WSA assigned a c2 certainty rating will be within a recognized evaporite basin.

c3: The c3 degree of certainty for potash requires the subsurface recognition (on the basis of well data) of at least one potash-bearing formation, or an abandoned or active potash mine, very near the WSA being evaluated. Nearby occurrences should usually be no more than a few miles from the WSA, although site- or area-specific information may indicate the use of greater or lesser distances. Assigning a WSA a c3 rating requires a much higher degree of certainty that potash-bearing rocks actually occur in the WSA, compared with a c2 rating.

c4: A c4 is assigned only when it is known that potash-bearing rocks underlie the WSA, regardless of the assigned favorability. [By definition, when a c4 certainty is used with an f1 favorability, it indicates with a high-degree of certainty that potash-bearing rocks do not underlie the WSA.]

Source: DOE, 1982.

4211 ENERGY REALTY
4212 NON-ENERGY REALTY
4213 WITHDRAWAL PROCESSING AND REVIEW

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Classification/Withdrawal.

Land Use.

Transportation System (Access).

RESOURCE OVERVIEW

At the field office level, all lands actions are managed as one program with three funding codes. Therefore, this MSA section has grouped 4211 Energy Realty, 4212 Non-Energy Realty, and 4213 Withdrawal Processing and Review. The resource (land) base is the same for all three subactivities.

Public lands in the SJRA are in large, blocked ownership, normally interpersed with state sections 2, 16, 32, and 36 per township. The resource area is entirely within San Juan County, which covers 5,045,760 acres. The boundaries of the resource area are the State of Colorado on the east, the State of Arizona on the south, the Colorado and Green Rivers on the west, and CNP and Grand Resource Area (BLM) on the north (refer to figure O-1 in the Overview). The Manti-LaSal National Forest is located in the center of the resource area. Private lands encompass the population centers, with the majority of private lands falling east of Monticello to the Colorado State line. There are a few scattered private inholdings within the public lands and some scattered isolated parcels of public land within the private land. See table O-3 for acreages of federal and nonfederal lands.

In 1980 the county population was listed as 12,253 (USDC, 1981a). Population centers in the resource area (and their 1980 populations) are Monticello (1,929), Eastland (302), Blanding (3,118), Bluff (847), Mexican Hat (495), and Montezuma Creek (1,223) (San Juan County Clerk, personal communication, December 1984).

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

National Laws

The primary legal mandate for all lands actions in the SJRA is FLPMA, which regulates all disposal, lease, permit, and easement actions on public lands, with the exception of leases and patents for R&PP, agricultural entries and subsequent patent on desert land, and rights-of-way for oil and gas production facilities. These actions are allowed under the Recreation and Public Purpose

Act of June 14, 1926, as amended; the Desert Land Entry Act of March 3, 1877, as amended by the Act of March 3, 1891; and the Mineral Leasing Act of 1920, as amended. These acts provide the legal basis for most of the lands actions in the resource area.

Permits, leases, and patents issued prior to FLPMA are controlled and regulated under the acts by which they were issued. For example, rights-of-way for communication sites and transmission lines were issued under the Act of March 4, 1911, and the County was authorized use of public lands for road purposes by R.S. 2477. However, these and many other laws and statutes were repealed in Title VII of FLPMA.

Other major mandates that regulate land use and disposal are as follows:

The National Historic Preservation Act of 1966 and EO 11593, May 13, 1971 provide for the protection of cultural resources. These mandates dictate that lands containing cultural properties of national register quality must be retained until appropriate mitigation can be performed.

The General Mining Law of 1872 precludes disposal of any public land encumbered by a mining claim, but use of the surface by BLM is allowed under the Multiple Surface Use Act of 1955. The Mineral Leasing Act of 1920, as amended, also precludes disposal of the surface of a KGS.

The General Allotment Act of February 8, 1887, as amended, governs Indian Allotments.

Additional mandates that must be considered in lands actions but usually do not affect lands management in the resource area are (1) The Clean Air Act of 1971; (2) section 404 of the Federal Water Pollution Control Act of 1971; (3) EO 11988, of May 25, 1977, Floodplain Management; (4) EO 11990, of May 24, 1977, Protection of Wetlands; (5) the Migratory Bird Act of February 7, 1936; (6) the Sikes Act of August 12, 1958; and (7) the Endangered Species Act of 1973.

Bureau Manuals

The BLM 2000 through 2900 manual series provides direction and guidance for all lands actions. These are supplemented with WO and USO instruction memorandums.

RESOURCE ALLOCATIONS

Land use allocations are made through a variety of means. Generally speaking, lands allocations fall into three broad categories.

Withdrawals withhold lands from disposal or other types of appropriation to maintain certain resource values or to reserve the lands for a particular purpose. They may be imposed only by the Secretary or by Congress (see Section 204 of FLPMA). They may act to remove areas from the public lands to the authority of another federal agency or department, but the land does not leave federal ownership. Withdrawals remain in effect until specifically revoked. While it is beyond the discretion of the Area Manager to make withdrawals, the RMP can serve as a basis for recommendations from the resource area through administrative channels that lands be withdrawn from certain uses or appropriations (cross-reference: Mining Law Administration, Part II).

Certain authorizations respond to public demand for specialized uses of the public lands of a more or less temporary nature. Examples are right-of-way grants, R&PP leases, or land use permits. These do not cause the lands to leave the public domain, although they may restrict or benefit certain uses. They may be for a set period of time or may be open-ended. They tend to cover small, scattered areas, and cannot be anticipated through the planning process.

Disposal actions usually respond to public requests or applications. They result in a title transfer, and the lands leave the public domain. Examples are state indemnity selections, private or state exchanges, desert land entries, public sales, or mineral patents. Disposal may be contingent upon the recipient's meeting certain conditions, such as in an R&PP patent, or may be absolute, as in a sale. These tend to involve scattered, discrete parcels, and cannot be anticipated through the planning process.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Lands actions are managed under one program, but are charged to three subactivity codes. Prior to FY 85, these codes were 4211 Energy Realty, 4212 Nonenergy Realty, and 4213 Withdrawal Processing and Review. Energy realty was set up to process energy minerals related rights-of-way, primarily under Title V of FLPMA and the Minerals Leasing Act of 1920. Nonenergy realty processed other rights-of-way and other types of lands actions. Withdrawal processing and review was established to conduct the withdrawal review mandated by Section 204 of FLPMA. Until FY 85, withdrawal review focused on BLM withdrawals only, and was handled at the USO and MDO level with input from the resource area.

With FY 85, subactivity codes have changed to group nonenergy and energy rights-of-way under 4211 Rights-of-Way. The remainder of lands actions fall under 4212 Lower 48 Lands Program. Withdrawal processing and review remains separate, but the code number has changed to 4220. With FY 85, the resource area office is scheduled to perform this function. Withdrawals held by other federal agencies will be examined at the rate of one agency per year. The schedule is fixed by USO in cooperation with the other agency, and is beyond the discretion of the resource area to change.

The primary objective of the lands program in the SJRA is to provide the public with the land it needs for rights-of-way, land use leases, or sales. The secondary objective is to provide support to other programs to protect and enhance the resources. The final goal of these two objectives is achieving a balance between land use and resource protection that serves the public at large.

Lands are currently managed under classifications, withdrawals, rights-of-way, short-term land use permits, and disposal actions. Unauthorized uses or trespasses also occur on public lands within the resource area.

In 1970 the majority of the public lands in San Juan County were classified under the authority of the Classification and Multiple Use Act of September 19, 1964 and in accordance with 43 CFR 2400. The classification segregated the lands from agricultural entry and disposal. Several recreation sites, the Grand Gulch and Dark Canyon PAs, and the Mormon Trail were also segregated from the mining laws, but not from the mineral leasing laws. Under the withdrawal review program enacted with the passage of the FLPMA, the classification was removed and the lands, except those shown in table 4211-1, were opened to the public land laws. The lands in table 4211-1 are still classified for retention and closed to entry under the public land laws, including the general mining laws, but not the mineral leasing laws (see the Classification/Withdrawal overlay).

In addition to the lands in table 4211-1, 4,612.28 acres in Dark Canyon; 4,960.16 acres in Grand Gulch; and 160 acres in Butler Wash were acquired in 1977 through a state exchange. While these lands are not classified or segregated, they have never been opened to entry (43 CFR 2200.3) under any federal laws.

Withdrawals are made under Section 204 of FLPMA. Withdrawals in the resource area that are specifically withdrawn for management by another agency are shown in table 4211-2 (see the Classification/Withdrawal overlay).

Additional withdrawals where the surface is managed by BLM with concurrence of the withdrawing agency are shown in table 4211-3 (see the Classification/Withdrawal overlay).

The DOE withdrawal is for DOE to manage uranium for research purposes. The locatable minerals estate of this land was withdrawn by the Atomic Energy Commission, which has been absorbed by DOE. This allows DOE to lease the locatable minerals to private concerns (cross-reference: Mining Law Administration, Part II).

Currently, 5,459.63 acres are under withdrawal by BLM as PWRs. A PWR is segregated from agricultural entry and ultimately from disposal. However, a review of these withdrawals under the authority of Section 204 of FLPMA was completed in 1982, and it has been recommended that 1,431.55 acres of the withdrawals be revoked. (These are not shown on an overlay.)

The FERC withdrawals are for possible powersite developments. Withdrawals 122, 219, and 397 are located on the San Juan River. Withdrawal 208, located on the Colorado River between Canyonlands and Arches National Parks, has been recommended for partial revocation.

What is commonly known as the Ute Indian reservation falls on White Mesa south of Blanding, Utah. This is not a formal reservation, but is part of the 12,297.43 acres of Indian Allotments within the resource area, which lie in

TABLE 4211-1

BLM Classifications

Site		Acres Classified
Dark Canyon Primitive Area		57,427.72
Grand Gulch Primitive Area		32,847.00
Sand Island Recreation Site		253.59
Arch Canyon Recreation Site		40.00
Kane Springs Recreation Site		80.00
Salt Creek Recreation Site		240.00
Alkali Ridge Historic Site		80.00
Mormon Trail		1,115.60
Butler Wash Archaeological Site		40.00
	Total	92,123.91

Source: Master Title Plats

TABLE 4211-2

Agency Management Withdrawals

Agency	Description	Acreage
National Park Service	Canyonlands NP	247,998.47
	Glen Canyon NRA	312,656.38
	Hovenweep NM	440.00
	Natural Bridges NM	7,620.49
	Rainbow Bridge NM	461.00
Forest Service	Manti-LaSal NF	366,853.91
	Baker Ranger Station	152.50
Bureau of Indian Affairs	Navajo Indian Reservation	1,220,492.56
		2,156,675.31

Source: Master Title Plats

TABLE 4211-3

Agency Withdrawals

Agency	Description	Acreage
Department of Energy		50.00
Federal Energy Regulatory Commission	Powersite Withdrawal #122	12,482.27
	Powersite Withdrawal #219	920.00
	Powersite Withdrawal #397	6,146.87
	Powersite Withdrawal #208	4,164.35
		23,763.49

Source: Master Title Plats

scattered tracts extending from the National Forest to the Colorado state line. These allotments were patented under the General Allotment Act of February 8, 1887. Indian Allotments are held in trust by the U.S. Government and managed by the BIA, but may pass on to fee simple title upon proper application by the allottee to the BIA.

Table 4211-4 summarizes land ownership and management in the SJRA.

There are six existing R&PP patents: two to the Utah State Parks and Recreation Division for Goosenecks (10 acres) and Newspaper Rock (10 acres); one to the Church of Jesus Christ of Latter Day Saints at Mexican Hat for a church (2.5 acres); and three to the City of Blanding, two for their municipal water system (258.8 acres) and one for the Westwater Ruin site (160 acres). There are two existing R&PP leases: one to the San Juan Foundation for Higher Education for educational facilities adjacent to the City of Blanding (120 acres) and one to the San Juan Water Conservancy District for recreational facilities at Recapture Lake (20 acres) (see the Land Use overlay).

The lands leased for R&PP are segregated from entry under the public land laws including the mining laws (43 CFR 2091.3-2). There is no provision for mineral entry or development on R&PP patents, even though minerals remain reserved to the United States. R&PP patents contain provisions allowing for reversion of the lands to the United States under certain circumstances.

There is one existing 5-acre business lease (43 CFR 2920) at Fry Canyon which was converted from a small tract lease. This parcel is still classified under the Small Tract Act and is, therefore, segregated from mining location (43 CFR 2091.3-1) (see the Land Use overlay).

The Bluff Airport lease, issued under 43 CFR 2911, covers 400 acres near Bluff. In accordance with the regulations, these lands are segregated from mineral location.

Rights-of-way across the public lands are generally granted under Title V of FLPMA and Title I of the Mineral Leasing Act (see 43 CFR 2800). These are issued for many purposes and change over time (are granted and expire). They are generally recorded on the master title plats found at the SJRA office, at the MDO, and at the USO. They are not shown on an overlay.

Short-term land permits are issued as needed for uses that qualify under 43 CFR 2920. These permits are for short-term uses such as filming and seldom number more than five at any one time. Because of their short duration and minimal effect they are not shown on an overlay.

Public sales are managed under the disposal criteria set forth in Section 203 of FLPMA (see also 43 CFR 2710). In summary, land can be sold under the following circumstances:

TABLE 4211-4

Ownership Summary

Owner/Manager	Acreage
National Park Service	569,176.34
Forest Service	367,006.41
Bureau of Indian Affairs	[a]1,243,490.87
Department of Energy	(50.00)
Federal Energy Regulatory Commission	(23,713.49)
State of Utah	244,955.22
Private	335,155.99
Bureau of Land Management	[b]1,779,193.21

NOTE: Acreages are not additive to San Juan County because of water surface and BLM Grand Resource Area acres.

[a] Includes 12,197.43 acres of Ute Indian Allotments and 10,700.88 acres of Navajo Indian Allotments.

[b] Includes DOE and FERC withdrawals.

(1) if it is isolated and uneconomical to manage, and is not suitable for management by another federal department or agency; or

(2) if the land was acquired for a specific purpose and is no longer needed; or

(3) if disposal of the land will serve an important public objective.

Of the 42 isolated tracts of land identified for disposal in previous BLM plans, only two have actually been offered for sale. Specifically, other resource uses (i.e., KGSs for oil and gas, mining claims, and cultural resources) have prevented the sale of these tracts. The Land Use overlay shows those lands that are unsuitable for sale. These are parcels that have been investigated and found to be in a KGS or have an abundance of cultural resources. Those parcels encumbered by mining claims are subject to change continually and are not mapped.

Unauthorized uses in the resource area are primarily in the form of agricultural trespass. These uses are usually adjacent to private farmland and are generally considered to be inadvertent or unintentional. Because of lack of BLM funding, there is no active program to eliminate these unauthorized uses. Because no inventory has been completed to identify the specific parcels involved, they cannot be mapped.

Certain hazards have been identified in the resource area as a result of past land use activities. All identified hazards are areas that were heavily mined prior to the passage of FLPMA. Open mine shafts and old mining equipment may pose a hazard to the public at large. The hazards are generally found in the geographic areas of White, Red, Montezuma Creek, and Coalbed Canyons and South Cottonwood Wash, but have not been mapped.

Current planning gives direction for certain broad objectives and for many site-specific actions. Most have been done. Those still pending are as follows.

The South San Juan and Montezuma MFPs recommended that lands adjacent to communities be made available for community expansion. A problem remains at Mexican Hat. All four MFPs recommended state exchanges to block state and federal ownership, to eliminate scattered tracts. One such exchange was completed in the Montezuma Planning Unit in 1977. Blocking of state and federal lands in the remainder of the resource area is now being considered in a different form through Project BOLD (UDNR, 1982). The Montezuma MFP recommended acquiring 640 acres of state land adjacent to Hovenweep National Monument to transfer to the NPS. The NPS has not submitted a proposal for such action.

The Montezuma and Indian Creek-Dry Valley MFPs identified 42 isolated tracts as suitable for sale. Only two have been offered for sale, but these were not sold because of lack of public interest. The remainder cannot be sold because of legal constraints (e.g., cultural resources and mining claims). The Montezuma MFP recommended providing rights-of-way for water projects to promote agricultural development. Providing for agricultural development and expansion is an ongoing concern in the resource area, either through lease, desert land entry, or other means, and is done on a case-by-case basis.

The Indian Creek-Beef Basin and Montezuma MFPs recommended study of proposed or existing road rights-of-way to reduce the proliferation of roads; the Montezuma MFP made a similar recommendation for mineral materials sites (cross-reference: Mineral Material, Part II). The South San Juan and Montezuma MFPs recommend designation of utility corridors. De facto corridors have formed, and it does not appear necessary to continue with this type of designation.

Two plan amendments over the past 5 years (since 1979) have been generated by lands actions in response to specific lands applications or requests not covered in the MFPs. This reflects the inability of the planning process to predict future site-specific lands proposals.

In general, the relevant direction from the four MFPs is to provide lands on a case-by-case basis for agricultural development, community expansion, and land sales. These types of recommendations will not be carried into the RMP because of the site-specific nature of individual requests.

IMP precludes lands disposal actions in WSAs or ISAs. Short-term uses including right-of-way grants are allowed if they meet the nonimpairment criteria. Rights-of-way, even impairing, must be allowed if providing access to inheld areas with valid existing rights. Examples would be inheld pre-FLPMA oil and gas leases or state and private inholdings.

To date, lands actions under IMP have occurred only in the Road Canyon WSA. A right-of-way was granted to an inheld state mineral lease, but the access road was never built. Issuance of the grant was upheld by IBLA in Utah Wilderness Association, 80 IBLA 64 (March 30, 1984).

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County.

For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

The local importance of the lands program is determined by the land uses with the lands actions and the alternative land uses without the lands actions. If the land use is identical with and without a lands action, then the action is neutral with respect to the local economy.

Lands actions are initiated either in support of other BLM resource management programs or in direct response to public demands.

Table 4211-5 lists the past lands actions that have supported other programs and the economic activities enhanced through these actions. In general, these support lands actions have enhanced recreation.

TABLE 4211-5

Lands Actions Supporting Other Resource Management Programs

Lands Action and Site	Acres	Economic Activity Enhanced
Classified Lands		
Dark Canyon	57,428	Recreation
Grand Gulch	32,847	Recreation
Sand Island	254	Recreation
Arch Canyon	40	Recreation
Kane Springs	80	Recreation
Salt Creek	240	Recreation
Alkali Ridge	80	Recreation
Mormon Trail	1,116	Recreation
Butler Wash	40	Recreation
Withdrawals		
Public water reserves	5,460	Grazing
	97,585	

The 92,125 acres of classified lands (1.8 percent of the county acreage) are closed to entry under the public land laws (including the general mining laws, but not the mineral leasing laws). Actions that would not be allowed in these areas include, but are not limited to, desert land entries, sales, R&PP patents, private exchanges, and mining claims.

Numerous actions can still be allowed on these classified lands, including, but not limited to, rights-of-way, land use permits, and leases. This would allow the construction of several types of capital investments and the exploration for and development of leasable minerals.

It is impossible to quantify the local employment and income indirectly generated or foregone through these lands actions.

The economic significance of lands actions supporting public demands varies and depends on the use to which the land is put and on the alternative land use foregone. Table 4211-6 lists the various lands actions responding to outside demands and those economic activities enhanced through these actions.

Economic activities are heavily restricted in the national parks, and heavily regulated on the Navajo Indian reservation. Except for uses that require some kind of disposal action, land uses under USFS management are similar to those under BLM management. FERC withdrawals do not restrict activities within the withdrawal area; however, these withdrawals may restrict long-term capital investments, since owners of capital investments would not be compensated for any loss if the sites were developed for hydroelectric power.

The degree to which other resource uses and related local employment and income are foregone due to past withdrawals could not be quantified. The USFS and FERC withdrawals have probably had little economic effect; however, the amount of land managed by NPS and the BIA as a result of agency withdrawals may have significantly affected the composition of the local economy, and possibly total economic activity.

The lands program also responds to outside demands for municipal, residential, agricultural, and industrial land uses through rights-of-way, sales, desert land entries, agricultural leases, exchanges, and R&PP leases and patents.

Community and privately owned or controlled land is essential for municipal, residential, agricultural, and industrial development. Table 4211-7 gives a breakdown of private lands by land use. Municipal and residential land uses are necessary to provide for the infrastructural and residential needs of county residents. Agricultural land uses are required to sustain the agricultural sector, the importance of which is discussed in 4322 Grazing Management. Other industries also require land, although to a lesser extent; the area's economy, as any other economy, is entirely dependent on its industries.

Table 4211-8 lists the various lands actions responding to residential, agricultural, and commercial demands and the economic activities enhanced through these actions. Although the local economy would not have differed significantly had these actions not taken place, these actions have reduced the costs of several infrastructural developments, allowed the construction of

TABLE 4211-6

Lands Actions Supporting Public Demands

Lands Action and Site		Acres	Economic Activity Enhanced
Agency management withdrawals			
CNP		247,998	Recreation
GCNRA		312,656	Recreation
Hovenweep NM		440	Recreation
Natural Bridges NM		7,620	Recreation
Rainbow Bridge NM		461	Recreation
USFS		367,006	-----
BIA		1,220,493	-----
Subtotal		2,156,674	
Agency withdrawals			
DOE		50	Minerals
FERC	No. 122	12,482	Energy Development
	No. 219	920	Energy Development
	No. 397	6,146	Energy Development
	No. 208	4,164	Energy Development
Subtotal		23,762	
R&PP patents			
Goosenecks		10	Recreation
Newspaper Rock		10	Recreation
Church		3	Community infrastructure
Municipal water system		[a]259	Community infrastructure
Westwater Ruin		160	Recreation
Subtotal		442	
R&PP leases			
San Juan Foundation for Education		120	Community infrastructure
San Juan Water Conservancy		20	Recreation
Subtotal		140	
Total		2,181,018	

[a] Acreage figure represents two separate patents.

TABLE 4211-7

Private Land Use

Private Lands			Acres
Urban			2,400
Rural			414,200
Agriculture	(362,921)		
Other	(51,279)		
		Total	416,600

Sources: USDA, 1977; USDA, 1984.

TABLE 4211-8

Lands Actions Supporting Residential, Agricultural, and Commercial Demands

Lands Action	Approximate Acres		Economic Activity Enhanced
Land use permits	15	per year	Filming, stockpiling, miscellaneous facilities
Rights-of-way	200	per year	Access, transportation, water, utilities
Sales	125	per year	Residential, agricultural, commercial
Desert land entries[a]			
Agricultural leases[a]			
Small business leases	5		Commercial development
Exchanges	2,500	per decade	

NOTE: Represents average ongoing workload for the past 3 years (since 1982).

[a] None issued.

numerous utility lines, and enabled the continuation of one small commercial development employing five people.

A shortage of privately owned or controlled land forces agricultural, municipal, residential, and industrial land users to bid up land prices. This usually results in both transfer of land (from agriculture and other industries that require much land) and economy of land use (less acreage per house, multilevel buildings, etc.).

For the most part, the supply of privately owned land in the area is fixed and can increase only through the disposal of state and public lands. Land under private control for agricultural, recreational, and public purpose developments can be increased through R&PP leases and patents, agricultural leases, and desert land entries.

Increasing the supply of privately owned or controlled land would result in lower local land prices than would otherwise be the case. An actual decrease in local land prices may not be observed if the demand for land is simultaneously increasing. The degree of impact depends upon the relative increase in private land and the similarity between the public land and the existing private land.

Some of the governmental costs related to managing the lands program contribute to local sales income and employment. These local governmental expenditures generate an estimated 3.1 jobs and $50,000 of personal income (see table 4211-9). Because much of the lands workload is in support of other programs, much of this local contribution is due to these other programs.

The lands program can affect the revenues and costs of local taxing jurisdictions. The fiscal effect is determined by the land uses and ownership with and without the lands actions. If the land use and ownership is identical with and without a lands action, then there is no fiscal effect. Lands actions that have reduced local economic activity have likewise reduced jurisdictional revenues, and those that have increased local economic activity have increased jurisdictional revenues. Because the relationship between economic activities enhanced and foregone due to lands actions cannot be quantified, the resulting fiscal effects cannot be quantified.

Counties receive a PILT for entitlement land within their boundaries. In 1984 San Juan County received $363,738 in PILT (see table 4211-10). The payment is based on both Congressional appropriations to the fund and either the county's entitlement acreage or the county's population. Payments can be as high as $0.75 per acre. San Juan County's population currently limits PILT payments; 2,337,000 acres of entitlement lands could be transferred to alternative ownership before PILT payments to the county would be reduced. Payments to the county now average $0.13 per acre.

PILT payments per acre are generally lower than revenues the county receives on lands under alternative ownership. For comparison, table 4211-11 presents local jurisdictional revenues per acre under various forms of ownership and land uses. Only entitlement land transfers to the state could reduce local jurisdictional revenues, and then only if over 2,337,000 acres of entitlement lands were transferred to state ownership.

TABLE 4211-9

Local Importance of the SJRA Realty Program Related Costs (FY 1984, 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Realty Program (dollars)	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	77,117	41,527	2.6
Other Sectors[a]		8,688	0.5
Total		50,215	3.1

[a] Includes the direct, indirect and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

Source: BLM Records; USFS, 1982.

TABLE 4211-10

Taxing District Revenues Related to Payments in Lieu of Taxes
(Calendar Year 1984 and Fiscal Year 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues due to Payments in Lieu of Taxes
Taxes	$3,543,909	$582,906	$7,530,196	$11,657,011	
Licenses and Permits	2,853	10,714		13,567	
Intergovernment	2,595,259	924,897	6,847,000	10,367,156	$363,738
Charges for services	227,039	82,810	148,000	457,849	
Fines and forfeitures	131,661	56,626		188,287	
Miscellaneous	970,241	285,855	447,820	1,703,916	
Totals	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$363,738

NOTE: Only taxes directly associated with the activity were assessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue sources are expected to be minor, these effects were not quantified. Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Yoakum, 1985; Smuin, Rich, and Marsing, 1984; Monticello, 1984; Utah Tax Commission, 1985; and Utah Foundation, 1985.

TABLE 4211-11

Local Taxing Jurisdiction Revenue Comparisons

Land Ownership	Payment	Local Revenues per Acre Range (dollars)	Average (dollars)
Entitlement lands	PILT	$ 0.10 - 0.75	$ 0.13
Private lands[a]	Property Taxes		
#4 Rangeland		0.49 - 0.74	0.50
#3 Rangeland		0.76 - 1.14	0.78
#2 Rangeland		0.98 - 1.47	1.00
#1 Rangeland		1.13 - 1.96	1.34
#4 Dry Tillable		1.63 - 2.45	1.67
#3 Dry Tillable		1.91 - 2.86	1.95
#4 Irrigated		6.87 -10.29	7.01
#3 Irrigated		7.19 -10.78	7.34
State school sections	PILT		
No capital improvements		0.00 - 0.00	0.00
Leased with capital improvements		0.49 - 0.74	0.50

[a] Private lands are broken down into assessment categories. The numbers given at left indicate assessor's category numbering.

Sources: Utah Foundation, 1985; Division of Finance, 1984; Personal communication, Barbara Montella, San Juan County Assessor, June 1985.

CONSISTENCY WITH NON-BUREAU PLANS

Local planning consists of the 1968 San Juan County General Plan, which is written in broad terms and zones the county lands into general categories. Under current BLM policy, both the San Juan County Commission and the Governor are asked to provide consistency review of each major lands action contemplated. The Commissioners are invited to comment on each individual action as it relates to county development. The Governor is asked to review plans and planning amendments for consistency with state or local plans, policies, or programs (43 CFR 1610.3-2(e)).

The current planning of the USFS and NPS do not directly affect lands actions in the SJRA, but may do so indirectly. For example, issuance of oil and gas leases in GCNRA could require access across public lands, which would require BLM action.

DATA GAPS

Hazards (mine shafts) are identified by geographic area, but a site-specific inventory is not available. Agricultural trespass is known to occur in the SJRA, but a trespass program cannot be implemented before a field inventory is completed.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

Rights-of-way to oil and gas leases and private lands, along with R&PPs for community expansion, constitute the primary demand for land use permits and authorizations in the resource area. These activities, along with occasional sales and other miscellaneous leases and permits, have required approximately 20 to 22 work months per year (for subactivities 4211 and 4212 combined) over the past 3 years (since 1982). Withdrawal review (subactivity 4213) required 1 work month in 1984.

Industrial, municipal, and agricultural demands for lands actions are discussed separately.

Industrial

The resource has met the demand. For example, existing rights-of-way have formed a de facto utility corridor through the resource area (see the section on current management practices and planning guidance in this chapter). That corridor enters Utah on private lands in the Ucolo area and traverses northwest through Lisbon Valley into the Grand Resource Area. The major highway corridors also contain utility lines. The resource area is limited by topographic and ownership patterns (i.e., the Colorado River to the west and the Indian reservation to the south), so that utility and transportation corridors have been established by need (cross-reference: Topography, Part I). There is minimal demand for communication sites, major changes to the transportation plan, or major utility systems.

Municipal

The only community expansion needs considered here are those of communities within and bordering the SJRA. Major communities in the SJRA include Monticello, Blanding, Bluff, Mexican Hat, Montezuma Creek, and Eastland. Table 4211-12 presents population and acreage estimates by community. Monticello, Bluff, and Eastland are surrounded by private lands, have vacant lands within the community, and have very low population densities. No community expansion needs have been identified for these communities. Blanding, Mexican Hat, and Montezuma Creek have been identified as possibly having community expansion needs.

Public lands abut western Blanding; however, Blanding has a low population density, available vacant lands within the community, and private lands to the north, east, and south.

Mexican Hat has an estimated population of 500. Approximately 20 private land owners own 1,700 acres in and around the town. Most of this land is undeveloped, and population density is low. However, two land owners control over 75 percent of the acreage, and frontage property is limited. Frontage property is controlled by eight owners, one of which is an estate. Land sales and purchases are infrequent in such a small community. Compounding the problem of a limited market, especially for commercial frontage property, the estate controlling much of the commercial frontage only leases property. The problem of acquiring ownership of frontage property is also compounded by the fact that a large strip of suitable frontage property is public land. According to BLM appraisals, the estate lease arrangements are comparable to frontage property ownership costs elsewhere in the county. Although there appears to be adequate private property to support community residential, commercial, and infrastructural needs, the distribution of property, especially frontage property, is causing imperfect market conditions.

Most of Montezuma Creek is on the Navajo Indian reservation. Land in the area is either allotted to Indians or leased. Most commercial property in town and residential property for non-Indians is leased from the BIA. Although the reservation does not restrict ability to lease commercial or residential lands, there may be a demand for owning lands that is not satisfied through leasing. Currently, seven property owners own a combined total of 63 acres near the town.

In 1984 BLM sold 25 acres of land to the private sector, which will partially alleviate the problem in Montezuma Creek. There is still no development on 23 acres of this land (as of July 1985).

Municipal demand for land is defined as the amount of land users are willing to purchase at a specified price, time period, and condition of sale. Therefore, the quantity of public land demanded for municipal uses depends on these three factors. However, given the availability of private lands in Mexican Hat, Blanding, and near Montezuma Creek, most municipal land demands can be supplied by existing private lands.

TABLE 4211-12

San Juan County Population and Private Acreage Estimates

	1980 Population	1984 Population	Private Acreage
San Juan County	12,253	12,752	
Monticello	1,929		[b]343
Blanding	3,118		[b]343
Bluff[a]	847		[c]3,452
Mexican Hat[a]	495		[c]1,694
Montezuma Creek[a]	1,223		[c]63
Eastland[a]	302		N/A

NOTE: Average municipal land use requirements, including commercial and infrastructure use, range from 0.06 to 0.1 acres per person in rural communities like those in San Juan County.

[a] Population estimates are given for voting precinct areas, which include not only these communities, but also large geographic areas outside the communities. Population estimates are therefore considered to be high.

[b] Does not include surrounding private lands or agricultural land.

[c] Includes surrounding private lands and some agricultural lands.

Sources: Walker, 1981a; Walker, 1981b; USDC, 1981; Utah 1984; Personal communication, Gail Johnson, San Juan County Clerk, July 1985.

Even though the quantity of public land demanded at existing market prices is thought to be low, available private land may not be as suitable for certain types of uses as are public lands. Also, private ownership of some isolated parcels of public land may be demanded where these public lands constrain the use of adjacent private lands. Such isolated demands for public lands can be determined only on a case-by-case analysis.

Community expansion requests are being met, except for the town of Mexican Hat. The residents of Mexican Hat have continually requested that adjacent public lands be made available for sale because private lands in the area are priced higher than residents wish to pay. However, disposal of these adjacent public lands is not allowed because they are in a KGS, which precludes disposal of the surface estate (cross-reference: Oil and Gas Leasing, Part II).

Agricultural

Production from rangelands and woodlands is usually compatible with multiple use management on public lands. However, cropland production on public land requires a lands action. The amount of land under crop production increased between 1969 and 1978, but dropped sharply in 1982 (see table 4211-13). Most of the fluctuation was due to nonpastured cropland. Despite the decrease of land under crop production, there remains some incidental cropland production on public lands associated with production from private lands. Therefore, most of the demand has been for lease or sale of agricultural lands now being used without authorization. For example, one individual discovered that some of his farm was in trespass after a new survey was completed. Other individuals have found, after buying a private parcel and having a private survey completed, that a few acres being cultivated are on public land. This unauthorized use is not being leased under 43 CFR 2920 because of BLM budget restraints, which have prevented completion of an inventory. Law requires that BLM conduct a cultural resource inventory, which is another cost related factor. Because of lack of private funding to mitigate impacts to cultural resources, several parcels identified for disposal in previous MFPs have had to be retained.

Because of requirements for mitigation of adverse impacts to cultural resources, the SJRA is not meeting the present public demand for leases or sales to the extent to which it could be met if cultural resources were not present.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

Aside from the price, the most important detriment for municipal land demand is population. Due to depressed economic conditions, San Juan County has recently experienced significant outmigration and, between 1983 and 1984, an actual population decrease of 1 percent. However, San Juan County's population is projected to grow by 18 percent by the year 2000, an annual growth rate of 0.9 percent. Available private land in and around communities in San Juan County and the existing vacant infrastructure due to local economic conditions should be adequate to supply municipal land demands through the year 2000. However, public lands may be desirable for municipal

TABLE 4211-13

Land in Farms, According to Use (acres)

	1969	1974	1978	1982
Farmland	491,057	507,196	411,693	362,921
Cropland	91,299	114,899	136,700	116,931
Woodland	25,526	18,636	29,309	25,016
Other land	374,232	373,661	245,684	220,974

Sources: USDC, 1977; USDC, 1981b; USDC, 1984.

use where available private lands are not as suitable for certain land uses as public lands are, and where public lands constrain adjacent private land uses.

There should be no problem in meeting the demands for community expansion. There is potential for either a 43 CFR 2912/2740 R&PP lease/patent, a 43 CFR 2920 lease, or a 43 CFR 2710 public sale in those communities adjacent to public lands. While disposal is precluded at Mexican Hat, leases for community or private purposes could probably be allowed.

The demand for agricultural land is expected to grow in proportion to growth in the agricultural sector. Employment in southeastern Utah's agricultural sector (Carbon, Emery, Grand, and San Juan Counties) is projected to decline by 0.9 percent a year, a 14 percent decline by the year 2000 (Utah, 1984). However, agricultural productivity will increase, and therefore, agricultural output should remain static.

Because the agricultural sectors of San Juan County and the other counties in southeastern Utah should experience similar changes, the local demand for agricultural land in San Juan County should remain static. Also supporting this conclusion is the historical trend of gradually declining farm acreage in San Juan County (see table 4211-13).

Future demands for agricultural lands may be greater than projected if additional agricultural lands are made available at below market prices, and if the cost of developing additional agricultural waters is subsidized.

Agricultural expansion will continue to be constrained, primarily by conflicts from cultural resource management.

The demand for new communication sites and for changes in the transportation plan and utility systems is expected to remain minimal for at least 15 years.

Utility corridors recommended in previous planning have not be designated. It is believed that the established de facto corridors will meet the anticipated future demand; therefore, utility corridor designation is not needed at this time.

Resource area funding is expected to remain at about 20 work months for rights-of-way and other lands actions and 1 work month for withdrawal review.

CRITICAL THRESHOLDS

While the lands program does not have critical thresholds, land actions can result in critical thresholds for other resources. For example, disposal of lands with high recreational values could create a significant impact on the recreation program.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Overall, the lands program functions smoothly. The program has adapted to the legal constraints, and management of the lands appears to be effective.

Encroachment onto the public lands for agricultural use will continue until BLM funding is available to conduct an inventory and allow a leasing program. It does not appear to be unwillingness on the part of the public to comply with the law, since individuals have approached BLM about a possible lease or sale. Unauthorized use, even though minimal, is increasing and could result in the eventual loss of surface resources.

Management of the public lands is eased where the ownership pattern blocks up public lands. Isolated parcels are more difficult for the BLM to manage because they are not suited to many of the dispersed uses of the public lands found within the SJRA.

MANAGEMENT OPPORTUNITIES

The Area Manager has the opportunity, through the planning process, to establish criteria for determining whether disposal of public lands is in the national interest. Previous planning efforts have recommended specific parcels for disposal, but the recommendations have not been successfully implemented. Public lands in the SJRA are suitable for disposal if

(1) the land meets one of the three criteria in Section 203 of FLPMA;

(2) sale of the land is not precluded by federal mandate, such as the Endangered Species Act or the National Historic Preservation Act; and

(3) the land is not more suitable for other resource management and development such as wilderness, grazing, or recreation, as identified in the RMP.

Under WO policy, BLM plans may identify lands as suitable for disposal only where it can be shown that Section 203 criteria can be met. This generally involves identifying isolated tracts, as was done under the MFPs, which has not proven to be successful in forecasting public demand. However, unless lands are identified for disposal in the RMP, a plan amendment would be required before any disposals could be allowed.

Areas identified as having serious conflicts among existing or potential surface uses can be withdrawn from various forms of appropriation or other surface uses. Withdrawals cannot be made through the RMP, but the RMP can serve to identify areas where withdrawals would be in the best national interest, and to recommend these areas to be withdrawn, along with the terms of the proposed withdrawal. Conversely, the RMP can serve to recommend areas where withdrawals from specified uses or appropriations would not be in the best national interest.

The Area Manager has the opportunity to propose alternative lands actions where certain actions, such as sales, are precluded. Where a mining claim, KGS, endangered species, or cultural resources are present, a short-term permit could be a solution, with proper mitigation of the conflicting resource. This type of opportunity would be in response to proposals on a case-by-case basis and cannot be anticipated through the planning process.

The Area Manager also has the opportunity to propose alternative lands actions to resolve unauthorized use or trespass.

Short-term permits for unauthorized use areas could be issued until BLM funding is available for long-term lease or sale.

ACEC POTENTIAL

No potential ACECs have been identified for management of lands actions in the SJRA. Management of lands actions is not believed to require special management to protect critical environmental concerns or natural hazards. The criteria of significant relevance and importance (43 CFR 1610.7-2) are irrelevant to the disposition of public lands under the realty programs.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Lands disposal and certain other lands actions are constrained by management of cultural resources. The expense of a cultural resource inventory or mitigation of identified sites can be prohibitive to a prospective purchaser or permittee. Creative solutions, such as privately funded mitigation or mitigation by a permitted university, are needed so that the cultural resource program does not lead to the retention of lands otherwise suitable for disposal (cross-reference: Natural History/Cultural Resource Management, Part II).

A possible solution is to more clearly identify which cultural sites are significantly rare on public lands. Possibly, through either recordation or minimal site work, such as testing but not excavation, disposal of the site could be allowed. This could be addressed in an MOU between BLM and the SHPO and the Advisory Council on Historic Preservation in accordance with 36 CFR 800. While BLM could act to facilitate these types of solutions, the action would be administrative rather than planning oriented.

Minerals programs constrain disposals and other types of actions such as R&PP patents. Mining claims prevent disposals or other land entries because the mineral entry carries a prior right to patent (cross-reference: Mining Law Administration, Part II). A KGS also precludes disposal of the surface estate (cross-reference: Oil and Gas Leasing, Part II). An alternative for the sale program that might be available is re-evaluating KGSs to see if boundaries are still valid. In some places it is possible that the designation could be removed or boundaries altered. Until this occurs, some allowable surface actions could be authorized under lease instead of sale. Designation or revocation of a KGS is not handled at the resource area level, so is beyond the authority of the RMP. Revocation could be recommended administratively.

The Endangered Species Act would preclude lease or sale of land unless the species would be benefited by the action. However, so few species of plants and animals are listed or proposed in the resource area that conflicts are minimal and are solved on a case-by-case basis (cross-reference: Vegetation and Wildlife, both in Part I).

Except for these legal constraints, other resources provide little hinderance to the lands program. Disposal or use of land is constrained only minimally and usually temporarily by the range management program. In order for a parcel of land to be sold, the grazing permittee must waive the AUMs that would be lost, or the sale must be subject to those privileges for 2 years. Any existing range improvements must be paid for by the successful bidder of the sale. If a lands action cancels an entire grazing privilege, the permittee is allowed 2 years before the action is taken. So while the lands action may be delayed, ultimately it is not constrained.

DOCUMENTED PUBLIC CONTROVERSY

The lands program as a whole does not generate a great deal of public comment. However, some individual actions do result in a great deal of controversy. For example, the siting studies for a possible nuclear waste repository near Gibson Dome have involved the public nationwide. On the other hand, an action to allow an access road through a WSA had only one opponent. Both issues were appealed to the IBLA.

Actions by the BLM USO, for which that office is directly responsible, also result in public comment both pro and con. These are primarily indemnity lieu selections.

4310 FOREST MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Forestry Special Use Areas.

Pinyon-Juniper Woodlands.

RESOURCE OVERVIEW

Forestry resources within the SJRA consist primarily of timber or woodland species. These are used for firewood, fence posts, and Christmas trees, and have incidental value for watershed, wildlife habitat, recreation, and visual resources.

Other vegetative products in the resource area include pinyon nuts, cactus, and wildlings. Wildlings include any of a number of wild plants that people desire for ornamental or medicinal purposes. Pinyon nuts in the area are smaller than those from a singleleaf pinyon. (Singleleaf pinyon are much more prevalent south and west of the resource area and occur infrequently within the SJRA.) Although the pinyon nuts are small, they are tasty. Good nut crops are rather unpredictable, but are generally expected 2 years after a good moisture year, or about every 5 to 7 years.

Resource area timber composition is dominated by the pinyon-juniper plant community (woodlands). This woodland type is composed of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and covers approximately 638,722 acres (about 35 percent) of the SJRA (BLM, 1972; BLM, 1974; BLM, 1976; BLM, 1978). All lands that do not have any woodland resource or other incidental timber species (about 65 percent of the resource area) are classified as nonforest lands (cross-reference: Vegetation, Part I). Pinyon-juniper woodlands are shown on the Pinyon Juniper Woodlands overlay.

Most of the pinyon-juniper grows at lower elevations where precipitation is insufficient for commercial timber species, such as ponderosa pine or Douglas fir. Typically it occupies intermediate elevations from 4,500 to 7,500 feet. Frequently the pinyon and Utah juniper form relatively pure stands. Pure juniper stands are characteristically open, whereas pure pinyon stands may be dense and forest-like.

Juniper dominates the lower elevations, pinyon pine the higher. Between the two extremes, a large ecotone (transition zone) exists, in which the two species are codominant.

Pinyon is a small pine tree, rarely exceeding 35 feet in height and 24 inches in diameter. The trees are typically single-stemmed with a short, straight trunk and many large branches forming a rounded, spreading crown. Open grown trees tend to be shrubby, with little or no limb-free trunk (BLM, 1976).

Utah juniper is also a small tree, usually less than 30 feet tall. Better post quality trees have a single trunk, 1 to 2 feet in diameter, but multiple stems extending from the ground or from a short basal trunk are also common. Open grown trees tend to be bushy and multiple-stemmed. The species has a soft, fine-textured wood, with light brown heartwood and creamy white sapwood (BLM, 1976).

The pinyon-juniper type appears to be the climax species in most areas where it occurs. There is very little undergrowth because of the competition for moisture and sunlight.

Diversity is an obvious feature of the pinyon-juniper woodland. It grows under a wide variety of climates, and on a variety of topography, parent material, and soil. The plant threads binding different communities together are the pinyon and juniper trees, which grow in many different densities, proportions, and sizes. At the upper end of the elevation range, the type mixes with Gambel oak and ponderosa pine; at its lower limits, it blends with grassland or desert shrub. Density of tree stands varies. In a few areas, where pinyon pine dominates, the trees are so dense that practically no understory exits. At the other extreme are areas where the trees (usually junipers) are widely spaced with a ground cover of herbaceous or shrubby plants.

Woodlands in the resource area are characterized by several large, open, natural parks. Pinyon-juniper invasion into these areas appears to be occurring slowly at this time. Invasion into chained areas appears to be occurring at a faster rate. This invasion is being aided by a lack of fire, which has resulted from the advent of organized fire control and from heavy livestock grazing. Livestock have reduced grass and shrub cover in many areas, so that lightning-sparked fires lack surface fuel to carry them from tree to tree.

Within the SJRA there are 57,000 acres of sagebrush railing and pinyon-juniper chainings (less than 5 percent of the resource area) that are susceptible to pinyon-juniper invasion.

There are a few other species located throughout the area in scattered, very limited concentrations. The most common are cottonwood (Populus spp.), several species of oaks (Quercus spp.), ponderosa pine (Pinus ponderosa), Douglas fir (Pseudotsuga menziesii, boxelder (Acer negundo), and quaking aspen (Populus tremuloides). Concentrations of these species are too low to have commercial value. All of them do, however, add to the scenic and watershed values of the resource area.

Ponderosa pine average 150 to 180 feet in height. The needles usually are 4 to 7 inches long and in fascicles of 3. Younger trees have blackish bark and are not flat-topped, while mature trees have a reddish bark and are flat across the top. It is the most important lumber tree in Utah. There is a small stand of ponderosa pine in the Woodenshoe Butte area that is a continuation of a larger stand on adjacent USFS land. The portion on BLM land, by itself, is too small for commercial cutting.

Small pockets of Douglas fir are found in drainages located on the north slope of Shay Mountain. This species occupies a total of no more than 100 acres on BLM land.

Field observations have not revealed any serious disease outbreaks in the SJRA. Insects and disease are not considered a problem in the pinyon-juniper types. Trees that have been weakened because of old age or sickness are subject to attack by insects and/or disease, but there are no records of major outbreaks. However, mistletoe has been noted on juniper, pinyon pine, and ponderosa pine. It is particularly heavy in some pinyon-juniper areas on Hart Point.

The ponderosa pine stands were investigated during the summer of 1976 for insect damage. Generally, it appeared that bark beetle was restricted to damaged or otherwise weak stands. However, a large stand of dead timber was located in the Grand Resource Area near the Colorado State line (T. 29 S., R. 26 E., Sections 17 and 20). Ponderosa pine within a large drainage have suffered nearly a 100 percent mortality rate. Subsequent investigations suggest that drilling operations may have caused the death of the trees and that the bark beetles entered the trees after they had died. The probable source of toxic material was from a nearby oil and gas site constructed in 1972 which placed a waste pit down into the drainage. Soil samples sent to the USFS were analyzed and showed normal high sodium levels (less than 1 p/m) above the pit and excessive levels (136 p/m) below the pit. USFS personnel examining the soil were convinced that spillage from the waste pit killed the trees (BLM, 1976). The relevance of these findings to woodlands in SJRA is uncertain.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

Federal Laws

FLPMA recognizes the nation's need for domestic sources of timber.

The Material Sales Act of July 31, 1947, as amended, authorizes disposal of timber and other vegetation resources on public lands, including lands embraced within unpatented mining claims located after July 23, 1955 unless expressly prohibited by other federal laws.

State Laws

The Utah Transportation of Forest Products Act of 1983 requires proof of ownership of forest products being transported, making it illegal to transport forest products off BLM land without a proper permit.

Federal Regulations

Regulations at 43 CFR 5400 govern sales of forest products on public lands.

Instruction Memorandums and Bulletins

BLM's USO has provided the following IMs which guide management of forest resources:

UT 83-150	provides revised state woodland product disposal policy which includes the de-emphasis on free use.
UT 84-73	provides further recommendations on the disposal of wood products in lieu of chaining an area.

Moab District IM UT-060-83-08 outlines formal district policy on firewood disposal.

Moab District Bulletin UT-060-84-B-137 contains recommended procedures for establishing green wood cutting areas.

RESOURCE ALLOCATIONS

In the past, BLM has issued free use permits for collection of dead wood. In 1983, the State Director notified the districts that free use was to become the exception rather than the rule. He specified that free use was to be allowed only where demand for domestic sales had ceased or where wood products had no in-place commercial value. The SJRA is the only resource area in the Moab District that still has designated free use cutting areas; the reason for this is traditional use by the Indians.

BLM policy now is to sell, either by bid or by permit, forest products that are in demand. Green wood and lumber are usually offered for sale by bid to establish fair market value. Although dead wood, posts, and Christmas trees are typically sold by permit, a bidding procedure is recommended when there is competition for commercial use of the product.

Rates are established by BLM Manual 5423; however, it is BLM policy to get as much for the product as the market will allow. Live specimen plants are also sold by permit. Pinyon nuts are free if gathered for personal consumption; otherwise they are subject to permit.

The BLM has authority to identify and establish areas for various types of permits and sales. This can best be done from inventory data that identify product density, regrowth potential, and rotation times. In the absence of such an inventory, permit areas are developed where other resource conflicts do not impose restrictions. The RMP can determine which portions of the resource area are clear of most resource conflicts. Designated permit areas will be chosen from the cleared portions, based on product availability and site accessibility, in an attempt to service major population centers and heavy use areas.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Because all of the woodland area is classified nonproductive (noncommercial), management for marketable products is generally restricted to firewood, posts, and Christmas trees.

Productive or commercial forest land is land that is producing, or has a site capable of producing, at least 20 cubic feet per acre per year of commercial tree species. The SJRA has no stands on BLM land that are capable of producing timber commercially. Although they are noncommercial timber lands, they have values for gathering vegetative products and for wildlife habitat, watershed, recreation, and visual resources.

Past cutting has been generally limited to dead wood for fuelwood, live juniper for posts, and live pinyon and juniper for Christmas trees. Large-scale removal of live trees has occurred only in the form of chainings. The resource area has set up blocks of live pinyon for commercial sale in the Maverick Point area. Cutting, which should begin in 1985, is meant to precede a chaining proposed by the grazing permittee. Woodland resources have not been greatly affected by past cutting practices, except for the removal of dead wood in the most accessible areas.

Areas that are excluded from fuelwood harvesting at this time include Beef Basin (the old Beef Basin Planning Unit) and the following developed recreation sites: Sand Island, Kane Gulch Ranger Station, Mule Canyon Ruins, Three Kiva Pueblo, and Butler Wash Ruins. The remaining area (1,509,525 acres) is open for private wood product harvesting. Commercial operations are restricted to chainings unless a separate EA clears a specific area for that purpose. A separate EA covers Peters Point for commercial Christmas tree harvesting and Maverick Point for commercial green wood harvesting.

Post cutting is now allowed only in designated areas that have been cleared through EAs. Seven separate areas have been designated, totaling 59,380 acres. These areas are shown on the Forestry Special Use Areas overlay. Christmas tree cutting is allowed anywhere in the resource area (on a total of 1,682,809 acres) for private use, except in PAs and developed recreation sites. Commercial Christmas tree cutting and free use fuelwood gathering are now restricted to chainings that have been cleared through EAs. There are eight such chainings on a total of 11,490 acres; these areas are shown on the Forestry Special Use Areas overlay.

There are no known legal access problems in the resource area that affect forestry management. Physical access is not considered to be a problem at this time. Although travel is seasonal, most areas can be reached by pickup truck or four-wheel drive. There are some scattered areas where steep terrain and drainages have precluded the building of roads.

IMP guidelines do limit the harvesting of wood products. Although the IMP guidelines are not completely clear, they do state that domestic firewood gathering, conducted under BLM permits, may be allowed to continue in WSAs where it was being done before October 21, 1976, as long as the nonimpairment criteria are met. Thus, fuelwood harvesting could be excluded from some WSAs.

Current planning is silent on forestry management, except that the Beef Basin planning unit is restricted from harvest of both dead and live wood. This objective is given in the Indian Creek-Beef Basin MFP.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County. For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodlogy section in Part III.

The local forestry industry is small, accounting for $69,000 of locally earned income and fewer than 10 wage and salary jobs (BEA, 1984a; BEA, 1984b). However, these income and employment statistics do not account for the total local economic significance of the SJRA's forest products. Most forest product use is noncommercial, and much of the commercial use is by small, part-time, proprietor owned and run enterprises.

There is one known sawmill in the county, employing fewer than 10 people. In addition to the sawmill, there are numerous individuals who sell firewood. The SJRA supplies a significant portion of the other woodland products used in the area, the most significant of which are fuelwood and Chrismas trees.

Recorded fuelwood use figures are presented in tables 4310-1, 4310-2, and 4310-3. Based on the number of dwelling units that rely on fuelwood for the majority of their heating needs, and on the proportion of fuelwood harvested by those living outside the county, the total fuelwood harvested in the county is estimated at 4,400 cords per year. Total fuelwood use by county residents is estimated to be 4,200 cords per year.

Estimated fuelwood harvest from the SJRA is 2,500 cords per year. This fuelwood use figure is 6 percent greater than the recorded use in FY 1983 and 70 percent greater than recorded use in FY 1984. These figures suggest a fairly high rate of compliance until FY 1984 when BLM initiated a fuelwood permit fee system. Based on these estimates, the SJRA supplies approximately 15 percent of the county's heating needs.

Fuelwood from the SJRA can be viewed as a recreational and cost saving activity for private users. The market for most commercial harvest is local and is used as a source of supplemental income to cutters. So far there has been little or no use by cutters who rely on fuelwood sales for most of their income, and few or no commercial harvests for outside markets.

Although private use of fuelwood and much of the commercial use is not reflected in commonly available economic statistics, local expenditures associated with fuelwood harvesting contribute to local income and employment. Based on fuelwood budgets, returns to labor and investment are approximately $25 per cord, and local expenditures are approximately $18 per cord (Marsinko, et al., 1984; Johnson and Grosjean, 1980). Based on these figures, approximately 3.3 jobs and $46,000 of personal income in the county can be attributed to fuelwood harvest in the county, 55 percent of which is due to harvest from the SJRA.

Until recently, most Christmas tree harvest in the SJRA was noncommercial and primarily a recreational and cost saving activity. However, over the past 2 years, an average of 9 commercial permits have been issued for 2,200 Christmas trees per year. Over 80 percent of the commercial harvest was by companies

TABLE 4310-1

Forest Product Sales and Free Use
(SJRA - FY 1982)

Forest Product Sales

Product	No. of Sales	Volume	Value
Fuel Wood	---	--- cords	$ ---
Line Posts	---	--- posts	$ ---
Corner Posts	---	--- posts	$ ---
Christmas Trees	143	143 trees	$ 143
Pinyon Nut	---	--- pounds	$ ---
Joshua Trees	---	--- trees	$ ---
Seedlings/Saplings	---	--- trees	$ ---
Yucca	---	--- pounds	$ ---
TOTAL	143	143	$ 143

Free Use Forest Products Granted

Product	No. of Sales	Volume	Value
Fuel Wood	426	2130 cords	$ 8520*
Line Posts	---	145 posts	$ 29
Christmas Trees	---	--- trees	$ ---

* Based on $4.00/cord

TABLE 4310-2

Forest Product Sales and Free Use
(SJRA - FY 1983)

Forest Product Sales

Product	No. of Sales	Volume		Value
Fuel Wood	36	150	cords	$ 390
Line Posts	46	3961	posts	$ 822
Corner Posts	---	---	posts	$ ---
Christmas Trees	888	937	trees	$ 1274
Pinyon Nut	---	---	pounds	$ ---
Joshua Trees	---	---	trees	$ ---
Seedlings/Saplings	---	---	trees	$ ---
Yucca	---	---	pounds	$ ---
TOTAL	970			$ 2486.00

Free Use Forest Products Granted

Product	No. of Sales	Volume		Value
Fuel Wood	347	2216	cords	$ 7017.50
Line Posts	3	215	posts	$ 47.50
Christmas Trees	---	---	trees	$ ---
TOTAL	350			$ 7065.00

TABLE 4310-3

Forest Product Sales and Free Use
(SJRA - FY 1984)

Forest Product Sales

Product	No. of Sales	Volume		Value
Fuel Wood	200	854	cords	$ 2217.50
Line Posts	60	2908	posts	$ 654.10
Corner Posts	---	---	posts	$ ---
Christmas Trees	2764	2782	trees	$ 2952.00
Pinyon Nut	---	---	pounds	$ ---
Joshua Trees	---	---	trees	$ ---
Seedlings/Saplings	4	290	trees	$ 320
Yucca	---	---	pounds	$ ---
TOTAL	3028			$ 6143.60

Free Use Forest Products Granted

Product	No. of Sales	Volume		Value
Fuel Wood	100	591	cords	$ 1,477.50
Line Posts	---	---	posts	$ ---
Christmas Trees	---	---	trees	$ ---

located outside the county. Local expenditures associated with private and commercial Christmas tree harvest generated an estimated $1,200 of personal income, and commercial harvest by local businesses generated another $2,000 of personal income (see table 4310-4).

Woodland products are also used by nonforestry business. This incidental use by other businesses represents a cost savings in that many woodland products are cheaper than their best substitutes. The most apparent of these incidental uses are the fence posts used in livestock production. Although the local importance of these woodland products cannot be quantified in terms of income and employment, they do represent a significant cost savings to users.

Some of the governmental cost related to managing forest products within the SJRA also contributes to local sales, and therefore to local income and employment. The resulting income and employment effects are summarized in table 4310-5. These effects account for less than 0.1 percent of local employment and income and are locally insignificant.

In addition to the income and employment effects, harvest of woodland products within San Juan County affects both revenues and costs of several local taxing jurisdictions. Related taxes brought an estimated $650 to local taxing jurisdictions (see table 4310-6). Harvest of woodland products in the SJRA brings an estimated $360 to local taxing jurisdictions. These figures are thought to be conservative, since they do not account for all related revenue sources.

CONSISTENCY WITH NON-BUREAU PLANS

The BLM routinely compares its sales policies with those of the USFS. Efforts are continuously made to keep the price and conditions for sale of fuelwood and Christmas trees consistent between both agencies.

DATA GAPS

Utah State University completed a woodland inventory in 1976 for four grazing allotments in the Hart Point area (Hart Draw, Turner Water, Lone Cedar, and Hart Point). While portions of this study provide good information on firewood, posts, pinyon-juniper density, etc., it does not cover the wide diversity of woodland and forest types found throughout the SJRA.

Another limited source of inventory data is a cruise inventory, completed in 1984, for a green wood sale on Maverick Point. Maverick Point has a relatively dense stand of pinyon-juniper; the average density of live pinyon trees alone was calculated to be 11.5 cords per acre (Alex VanHemert, Outdoor Recreation Planner, SJRA, personal communication, October 1984).

Other than these limited inventories, no data are available for forest resources in the SJRA.

TABLE 4310-4

Estimated Local Income and Employment Generated by Harvesting Fuelwood and Christmas Trees from San Juan County and the SJRA (1982 first quarter dollars)

	San Juan County		SJRA	
	Personal Income (dollars)	Employment (jobs)	Personal Income (dollars)	Employment (jobs)
Fuelwood	$47,000	3.3	$27,000	1.9
Christmas Trees	a	a	3,200	0.2
Totals			$30,200	2.1

Note: Personal income includes wages and salaries, dividends, interests, and rents, plus transfer payments and residential adjustments. Public administration income and employment are not included (see table 4310-5).

[a] Could not be quantified.

TABLE 4310-5

Local Importance of the SJRA Forestry Program Related Costs (FY 1984, in 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Forestry Program	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	$5,300	$2,929	0.22
Other Sectors[a]		71	0.004
Total		$3,000	0.224

[a] Includes the direct, indirect and induced effects of both government purchases of local goods and services, and the local expenditures by government employees.

Source: BLM Records; USFS, 1982.

TABLE 4310-6

Forestry Related Taxing District Revenues (Calendar Year 1984 and FY 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues Due to Forestry Product Harvest in San Juan County	SJRA
Taxes	$3,543,909	$ 582,906	$ 7,530,196	$11,657,011	$650	$360
Licenses & Permits	2,853	10,714		13,567		
Intergovernment	2,595,259	924,897	6,847,000	10,367 156		
Charges for Services	227,039	82,810	148,000	457,849		
Fines & Forfeitures	131,661	56,626		188,287		
Miscellaneous	970,241	285,855	447,880	1,703,916		
Total	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$650	$360

Note: Only taxes directly associated with the activity were asssessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue resources are expected to be minor, these effects were not quantified. Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Monticello, 1984; Smuin, Rich, and Marsing, 1984; Utah Foundation, 1985; Utah Tax Commission, 1985; and Yoakum, 1985.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

Demand is the amount of goods or services that users are willing to take at a specified price, time period, and condition of sale. The administrative prices charged for woodland products and the quantity of wood demanded at these prices are given in tables 4310-1, 4310-2, 4310-3, and 4310-7. These prices are low enough, relative to the final product's value, that these administrative charges are not thought to affect the quantity of woodland products demanded. Because there is little inspection and enforcement by BLM, the risk of being caught without a permit while harvesting forest products is so low that many who harvest these products pay no price at all.

Only the demand for fuelwood and Christmas trees is significant enough to warrant discussion.

The demand for fuelwood has climbed dramatically over the past several years. Between 1978 and 1981, recorded use climbed 63 percent, and between 1982 and 1983, use climbed 11 percent. Between 1983 and 1984, recorded use dropped 39 percent. The decrease in recorded use was probably due to a policy change which emphasized sales over free use. This price increase for legal firewood harvesting encouraged the unrecorded and illegal gathering of firewood. Actual firewood gathering probably continued to increase in 1984. Over 95 percent of the firewood harvested from the SJRA, both privately and commercially, is used by county residents. The dramatic rise in fuelwood use is due to a significant population increase in San Juan County and to a rise in the proportion of housing units using fuelwood as a major heating source. The rise is most likely due to the significant increase in cost of alternative heating sources, which makes wood more economical to burn.

Recorded fuelwood harvests in the SJRA are given in table 4310-3. However, inspection and enforcement are nonexistent, and actual fuelwood harvest may be significantly higher. Based on the number of local housing units using fuelwood as a major heating source, average fuelwood use per household, and the amount of fuelwood collected from other nearby lands, existing use of fuelwood is estimated to be 2,500 cords per year. This estimated use is 6 percent greater than recorded use in 1983 and 70 percent greater than recorded use in 1984.

Areas of highest demand include the south end of Cedar Mesa, for people coming up through Mexican Hat, and areas adjacent to the town of Monticello and Blanding. It is generally believed that illegal wood gathering occurs frequently, making it difficult to control use and availability.

Unlike firewood, where over 98 percent of the use is from county residents, most of the demand for Christmas trees is from outside the county. According to recorded use, private use accounts for approximately 5 percent of existing use, with commercial use accounting for the remaining 95 percent. Over 75 percent of the commercial harvest is by nonresidents for sale outside the area, mostly in the Salt Lake Valley.

TABLE 4310-7

Administrative Charges for Woodland Products (1984)

Item	Price per Unit
Fuelwood	$2.50 per cord
Posts	$0.20 - 0.90 per post
Poles	$0.02 - 0.07 per pole
Live trees	$1.00 - 25.00 per tree
Christmas Trees	$2.00 per tree
Pinyon nuts	$0.10 per pound
Cactus	
Prickly pear	$0.50 - 3.00 per clump
Other	$1.00 - 3.00 per cactus
Yucca	$3.00 - 5.00 per yucca

Based on recorded use, 4 percent of the county households harvest Christmas trees from the SJRA. However, because of the amount of unrecorded use, recorded use underestimates the proportion of use by county residents. Use by county residents has increased gradually in proportion to local population increases. Over the past several years, sites where the trees are of high quality, access is easy, and the stumpage price of the permit is low, have become increasingly scarce. This has made some Christmas trees in the SJRA competitive for commercial harvest. Christmas trees have a much higher value per unit of weight than does firewood; therefore, transportation cost per mile forms a much smaller portion of total harvest cost for Christmas trees than for firewood. Quality sites with low stumpage price are therefore economical to harvest for nearby metropolitan areas such as the Wasatch Front.

The resource area has an overabundant supply of wood products far in excess of the public demand. These products are being depleted close to population centers, but observation indicates that with farther traveling distance, wood will continue to be available for existing needs for at least the next 10 years (until 1995).

To date the forestry program has concentrated on providing families with fuelwood from the dead pinyon-juniper throughout the resource area. An occasional commercial operator is also allowed access to fuelwood, but such use is directed to existing chainings. Green wood removal has typically been restricted to vegetative manipulations that remove pinyon-juniper in preference for livestock and wildlife forage. There has been, therefore, no reason to begin a reforestation program. The current demand for commercial green wood cutting is being tested at Maverick Point. Although there has been some interest, the demand has not been overwhelming.

Program emphasis is now on the sale of products with a sharp de-emphasis on free use. Free use has therefore dropped considerably in FY 84 from what it was in previous years. Tables 4310-1, 4310-2 and 4310-3 show SJRA forest product disposition for FYs 1982 through 1984. These figures show an almost complete conversion from free use in and before FY 1982 to sales in FY 84. The tables also show that, although vegetative use is primarily for firewood, posts, and Christmas trees, people do have an interest in other vegetative products.

Areas of highest demand include the south end of Cedar Mesa, for people coming up through Mexican Hat, and areas adjacent to the towns of Monticello and Blanding. It is generally believed that illegal wood gathering occurs frequently, making it difficult to control use and availability.

Two work months were programmed for forest management in FY 84. This covered issuance of permits, etc., but did not allow for resource inventory or compliance.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

The most important determinants of the demand for forest products are (1) price and characteristics of the resource; (2) price and characteristics of the substitutes; (3) population size and distribution; and (4) population tastes and preferences.

Based on population projections of the areas now harvesting wood from the SJRA (the third factor), the demand for firewood is projected to increase 18 percent by the year 2000, for an average annual increase of 1.1 percent. The proportion of households using firewood as the major heating source has increased 19 percent between 1970 and 1980. This increase was due to factors 1, 2 and 4. Using a straightline trend projection based on the increased proportion of wood-heated homes between 1970 and 1980, along with population projections, firewood use is projected to increase 54 percent by the year 2000 (a 2.9 percent annual rate of growth). The relative price increase of substitutes which occurred between 1970 and 1980 is projected to continue through the year 2000; however, the rate of growth is expected to be less. The growth in demand by the year 2000 is therefore projected to be somewhat less than 54 percent, but greater than 18 percent.

The existing commercial market is almost entirely local. Transportation is a major cost of commercial harvesting, averaging from $0.06 to $0.09 per mile per cord. The quantity of commercial fuelwood demanded is therefore sensitive to distances from major markets. Retail prices in major markets have stabilized as substitute wood sources and substitute heating fuel prevent further wood price increases.

Unless the relative price of substitute heating fuel increases substantially, and substitute wood sources dry up, commercial demand for the SJRA's fuelwood should remain static.

Christmas tree demand is most sensitive to population increases and the price and availability of substitute sources. Based on population projections for the areas now harvesting Christmas trees from the SJRA, the demand for Christmas trees from the SJRA is projected to increase 34 percent by the year 2000, an average annual increase of 2 percent. In addition to the population factor, the availability of substitute harvest areas may play an important role in further increasing demands (particularly commercial demand) catering to outside markets. Without inventory data on substitute harvest sites, the degree to which this factor is expected to further increase the demand for Christmas trees from the SJRA is unknown.

The demand for other forest products is expected to remain static.

It is expected that the resource area forestry resources will be sufficient to meet the demand for the next 10 years (until 1995). However, it is also anticipated that, due to the long period of time required for regeneration of forestry resources, the resource area will not be capable of meeting demands past the year 2000. The available forestry resource (dead wood for fuel) will become depleted in high use areas unless a change in BLM managment of the resource occurs within the next 10 years.

The funding threshold for proper managment would be on the order of that necessary to fund 6 work months annually, with extra available for advertising, vehicle costs, and necessary inventory contacts.

CRITICAL THRESHOLDS

Critical threshold levels that need to be considered in analyzing impacts to forest resources include rotation time for reforestation of harvested timber. This threshold level will vary depending on site suitability and factors like soil depth and moisture availability. The average expected rotation time is 90 to 100 years.

A critical threshold would be reached at such time as all dead wood in readily accessible areas is collected. At this point, BLM experience in other Utah districts shows that people start to cut green wood without a permit. When this happens, BLM can no longer manage for sustained yield of forest resources.

Another critical threshold is the level of funding because impacts can be detected, planned for and eliminated or mitigated only with proper levels of human and monetary resources.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Under the confines of current funding there is very little, if anything, that can be accomplished besides routine work such as issuance of permits for fuelwood, posts, Christmas trees, and other incidental products. Other day-to-day program requirements include reporting vegetal disposals, responding to information requests, tracking program progress, and implementing policy changes.

Decades are required for the pinyon-juniper to reach maturity. Juniper species grow faster. Where pinyon is managed as a single species, the rotation must be extended over a long period of time, 90 to 120 years. The juniper rotation can be shorter. This rotation requirement has not received adequate consideration in the management program for the pinyon-juniper ecosystem (BLM, 1976).

Dead wood is being irretrievably removed. Dead wood taken from easily accessible areas cannot be replaced until live trees in the area die. Chaining projects, if maintained for increased grass production, represent irreversible commitments of the resource. Proper management with adequate funding could capitalize on these situations. If fuelwood gathering were limited to specific areas, dead wood could be fully utilized. Proper management is currently limited by having the whole resource area available for harvesting dead wood. Advantages of confining use would include more direct control of the program and the wood resource.

The dead wood being harvested now is clearly a finite resource. Standing green wood cannot be classified as a short-term renewable resource because of its lengthy rotation time. Although these products are expected to be available through the next 10 years, needs past the year 2000 cannot be met without proper management now. The capability for such management is not available now and does not appear likely in the near future.

The BLM is required by FLPMA to manage forest resources for sustained yield. To assure sustained yield, public demand imposes a requirement for land managers to make wood available while guaranteeing future availability. BLM personnel and monetary resources are not adequate to meet this demand. There is no real control over illegal harvesting of the public's wood products. Resources are not currently available to ascertain, in any detail, present stocking levels for proper sustained yield management. Likewise, human and monetary resources are not available to assertively determine potential for commercial fuelwood harvest, especially for the harvesting of green wood.

MANAGEMENT OPPORTUNITIES

In order to guarantee sustained yield, an accurate inventory of the entire resource area would be needed. From that inventory, permit areas could be established that would make the best use of the forest resources identified. An effective compliance program would provide an incentive to buy a permit. Usage would need to be directed to the areas with the greatest need, considering stand density, wood waste from nonuse, site suitability for regeneration, access, and the need for additional access and conformity with other program objectives. Work associated with such management would include appropriate planning and preparation of EAs with associated clearances. This could be accomplished with the funding threshold identified earlier, if a proper inventory were completed.

This opportunity could best be achieved by basing available permit areas on forestry inventory data. This data should identify stand density, regrowth potential, and rotation time. Sites should be evaluated to determine the maximum cubic feet of wood per acre per year capable of being produced, and permits could be used to hold harvest to that level. However, such data are not available and are not likely to be obtained within the next 10 years (before 1995). A plan amendment could be prepared to establish permit areas if these data become available.

In the absence of forestry inventory, the RMP can be used to define permit areas by establishing criteria such as accessibility, availability, and conflict resolution. The RMP can define areas excluded from harvest due to other resource conflicts, with the remaining area open for cutting Christmas trees, fuel wood, and posts, and for collecting specimen plants on a permit basis. Within this area, designated sites could be established based on proximity to high demand areas, such as Monticello and Blanding; accessibility, particularly areas along highway U-261; and product availability. These specific sites would be cleared through EAs after the RMP defines available areas.

Increasing public concern for environmental quality has led to support for including aesthetic appreciation in the resource allocation decision making process. There is also an increasing level of interest in the pinyon-juniper area as a desirable environment for wilderness, aesthetics, and general recreation. For example, in terms of visceral response of the public, pinyon-juniper chaining has been rated as an aesthetic management operation similar to strip-mining and clearcutting (BLM, 1976). Accordingly, the opportunity exists for the land manager to consider alternatives to past chaining practices when assessing future land treatment proposals. This could be done through a site-specific EA instead of through the RMP.

Designated free use areas should be eliminated to conform to BLM policy. Free use can be accommodated on an individual basis when appropriate, such as for nonprofit organizations.

Prior to removing products for land treatment purposes, the vegetative material could be offered for sale. If no commercial demand is expressed, the products could be given away via free use permits. Two years are needed for necessary planning, advertisement, and harvesting before wood products are disposed of by land treatment or until it is determined that there is no demand for the wood.

Existing chainings could be made available for Christmas tree harvesting prior to maintenance by burning. Future proposed chainings could be made available for green wood cutting prior to, or in lieu of, actual chaining. Such an area could be used first for a commercial green wood sale, second for a juniper post cutting area, and then for private harvesting of dead wood in an area that by that time would be open and accessible. The area could then be maintained by allowing Christmas tree harvesting of new growth or by letting the area regenerate naturally as new sites are opened up for the same sequence of use.

Interest has previously been expressed in using pinyon-juniper woodlands for more unconventional products such as pulp and papermaking, juniper oil, and manufacture of various fragrances. Reports have been written on these possibilities but, although opportunities still exist, recent interest has not been evident. This type of use would be addressed on a case-by-case basis and cannot be anticipated through the planning process.

ACEC POTENTIAL

No potential ACECs have been identified for the forest resource in the SJRA. The tar sand resource present is not believed to require special management to protect critical environmental concerns. The resource value of the in-place forest resource does not fulfill the criteria of significant relevance and importance (43 CFR 1610.7-2).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Some constraints are placed on the forestry program by range management (cross-reference: Grazing Management, Part II). The timing of chainings or chaining maintenance operations does not always maximize the woodland products on lands being treated.

Archaeological constraints are also a routine consideration (cross-reference: Natural History/Cultural Management, Part II). Lithic scatters and other archaeological discoveries frequently preclude the harvesting of products from areas encompassing such sites. The amount of wood products isolated by this constraint is generally not significant.

Wood gathering on steep and unstable slopes could be prevented by watershed constraints (cross-reference: Soil, Water, and Air, Part II)

Where exploration for minerals or oil and gas have required new road construction, a limited number of trees have been impacted by removal. Again, such impacts are minimal and the benefit from additional access probably outweighs the actual loss of trees.

IMP prevents the harvesting of green wood and the expansion of present dead wood gathering in WSAs and ISAs. WSA lands that could be involved include Slickhorn/Johns Canyon WSA from highway U-261 to the rim of Johns Canyon; Road Canyon WSA from its western border to the rims of Lime and Roads Canyon; and both Road Canyon and Owl/Fish Creek WSAs between the Snow Canyon road and adjacent rims. Approximately 26,000 acres of land could be excluded from harvesting that would otherwise be accessible.

These WSAs are located in an area that is heavily used for fuelwood harvesting by people coming north out of Mexican Hat. There is already some wood gathering taking place within the WSAs and as available wood in non-WSA land is removed, the WSAs are likely to become more desirable areas for collecting fuelwood. This could cause an increase in the current level of noncompliance.

PA designation precludes harvesting of green or dead fuel wood. This would apply to the Grand Gulch and Dark Canyon PAs (a total of 99,847 acres, or about 5 percent of the resource area).

DOCUMENTED PUBLIC CONTROVERSY

None.

4322 GRAZING MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Grazing Allotments.

Potential Land Treatments.

RESOURCE OVERVIEW

Grazing use in the SJRA today is based on historical use and on the availability of forage and water.

Grazing History

Cattle were first brought into the area in 1879, with sheep following in 1885 (Peterson, 1975). Cattle numbers peaked by about 1890. By the mid 1890s sheep began to replace cattle as many operators converted partially or wholly to sheep because of economic conditions (Peterson, 1975). The reverse switch from sheep to cattle occurred during the 1950s, again because of economics.

BLM lands were historically used primarily for winter and early spring grazing (November 15 thru June 1), but also for year-round grazing where livestock water was available. Forest lands provided summer grazing for many of the livestock wintering on BLM, but not for all, since the limited summer range produced considerably less than the vast acreage of winter range (Peterson, 1975).

Livestock-Vegetation Relationships

Vegetation is a basic component of the grazing resource (cross-reference: Vegetation, Part II). Four main vegetative associations are used by livestock in the SJRA: pinyon-juniper, saltbush, sagebrush, and blackbrush. Three other areas of concern are riparian areas, poisonous and noxious plants, and ecologically unique areas.

Pinyon-Juniper

The pinyon-juniper association produces very little forage for livestock. This is due to the scarcity or absence of understory forage species caused when trees sap the moisture and nutrients and, in some areas, by shallow soils unsuitable for livestock forage species (cross-reference: Soil, Water, and Air, Part II).

In many of these pinyon-juniper areas the soils and precipitation are adequate to support desirable forage species if the overstory is removed. This has been done by chaining and seeding in many areas (cross-reference: Forest Management, Part II). Crested wheatgrass seedings are used primarily for fall and spring grazing. Cattle distribution problems in these seedings result from lack of stock water. Some permittees haul stock water to these seedings.

All of the seedings were originally pinyon-juniper or sagebrush areas. In the 20 to 25 years since most of these seedings were completed, pinyon-juniper and sagebrush have become re-established and are now competing aggressively with grass species. Most of these seedings are losing their value for grazing and need to be treated within the next 5 to 10 years to control reinvasion of trees and shrubs, if their usefulness for livestock grazing is to be maintained.

Saltbush

The saltbush type generally produces a mixture of browse and grass species for livestock. The most common species are fourwing saltbush, shadscale, Mormon tea, curlygrass, and Indian ricegrass. Most of these areas are accessible to livestock, but use is often limited or precluded by a lack of stock water. Reservoirs are the main source of water, and these are often dry during the winter and spring use periods. The one sheep allotment in the resource area includes a saltbush zone. All other use in this zone is by cattle.

Sagebrush

The sagebrush zone includes some of the better winter grazing areas in the SJRA, as well as areas with very little grazing value. Forage in the better grazing areas includes fourwing saltbush, Mormon tea, blue gramma, needleandthread grass, and Indian ricegrass. These areas are generally accessible to cattle, but often lack adequate stock water.

Areas with little grazing value are primarily big sagebrush with very little perennial grass understory. Understory species that are present are generally blue gramma and curlygrass. Many of these sagebrush areas were the predominant sheep use areas in the 1940s and 1950s when sheep were more common. Most of these areas are now used by cattle during fall, winter, and spring, except one allotment which is still used by sheep during this same season.

Blackbrush

Blackbrush areas that support stands of forage species such as fourwing saltbush, shadscale, Mormon tea, Indian ricegrass and curlygrass are useful for livestock grazing during fall, winter, and spring. Blackbrush itself is generally not used by cattle if other forage is available.

Riparian Areas

Riparian areas constitute less than 1 percent of all vegetation types in the resource area (cross reference: Wildlife Habitat Management, Part II). These areas are generally accessible to livestock and are heavily utilized because of their lush vegetation, available water, and shade.

Poisonous and Noxious Plants

Poisonous and noxious plants are present throughout the resource area, but generally do not occur in concentrations that would pose a significant threat to livestock. Poisonous plants that occur include locoweed (Astragalus spp.), deathcamas (Zigadenus paniculatus), copperweed (Oxytenia acerosa), halogeton (Halogeton glomeratus), greasewood (Sarcobatus vermiculatus), larkspur (Delphinium spp.), and Gambel oak (Quercus gambelii). Copperweed and grass tetany poisoning from spring grazing on crested wheatgrass have been the main sources of stock losses. One instance of a loss of 24 cattle from copperweed poisoning in 1967 is the most serious instance known (BLM, 1976). Losses from grass tetany are estimated to be fewer than 5 head per year.

Ecologically unique areas include some of the isolated mesa tops scattered throughout the area. These could be considered relict areas, since inaccessibility limits or precludes livestock and wildlife grazing. Van Pelt's study (1978) of some of these areas contains specific information. Hanging gardens along seeps in canyons contain unique species confined to limited habitats. Holmgren (1976) described some of these plants.

Ecological Condition and Trend

The ecological condition of each allotment is shown in table 4322-1. Monitoring studies are being established on many allotments so that trend can be determined over the next 5 or more years.

Water

Livestock water is generally scarce over the entire area. There are numerous reservoirs, but they are generally not dependable. Most of the water supply for these reservoirs comes as runoff from rainfall in summer and fall, but this is relatively unpredictable. Very often the water collected in these reservoirs has seeped out because of poor water holding capability of the soil, or has evaporated by the time livestock enter the area. Springs, wells, and pipelines are more reliable; however, in many areas these types of developments are not possible. Constructed rock tanks are somewhat more successful than reservoirs, because they generally (1) have a smaller area of water surface exposed to evaporation, (2) can be more easily sealed from leakage, and (3) have a less permeable slickrock watershed apron.

Water wells provide dependable water where they occur, but they are not numerous. Many developed wells are the result of water encountered in drilling for uranium or oil and gas. Drilling for water in much of the resource area has a low success rate because the underground strata are too fractured to collect water or the aquifer is so deep that pumping is not economical (cross-reference: Water, Part I).

Revised 7/19/85

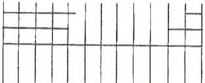
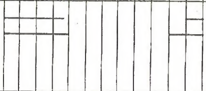
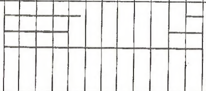
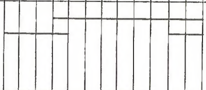
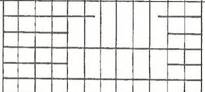
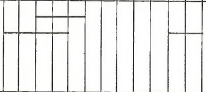
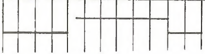
TABLE 4322-1

Present Management Category, Ecological Condition, and Livestock and Wildlife Use, by Allotment

Allotment	Category	Allotment Acreage[a]		Ecological Condition[c] by Percentage of Allotment					Number and Class of Livestock and Wildlife Species[e]	Season of Use												Active Preference (AUMs)[f]	5-Year (3/79-2/84) Average Use (AUMs)[g]	Total Nonuse Past 5 Yrs (Years)
		Noncritical	Critical[b]	RO/BD[d]	Early Seral	Mid Seral	Late Seral	Climax		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
6801 Alkali Canyon	I	10,510	13,400 dw Aq/Rip 1 mile	9	30	26	30	5	325 Cattle	—	—	—	—	—						—	—	2,362	1,349	0
									12 Horses	—	—	—	—	—						—	—			
									393 Deer	—	—	—	—							—	—			
									1 Deer	—	—	—	—	—	—	—	—	—	—	—	—			
6802 Alkali Point	1	6,785	900 dw	6	62	13	10	9	279 Cattle					—	—							340	282	0
									6 Horses	—	—									—	—			
									75 Deer	—	—	—	—							—	—			
4830 Bear Trap	C	1,540	---	--	--	100	--	--	58 Cattle							—	—	—	—			130 (50% public	102 lands)	1
									12 Deer	—	—	—	—							—	—			
4826 Big Indian	I	12,065	--- Aq/Rip 7 miles	29	24	47	--	--	223 Cattle	—											—	810	750	0
									85 Cattle			—	—	—										
									42 Oeer	—	—	—	—							—	—			
6804 Black Steer	C	4,300	---	15	15	61	9	--	540 Sheep	—	—	—	—								—	537	314	2
									2 Oeer	—	—	—	—	—	—	—	—	—	—	—	—			
6835 Blue Mountain	C	320	---	--	--	77	23	--	10 Cattle							—	—	—				30	20	2
									1 Deer	—	—	—	—							—	—			
									7 Oeer					—	—	—	—	—	—					

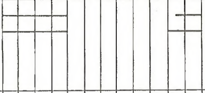
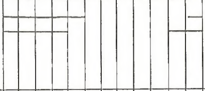
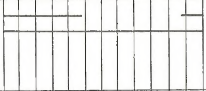
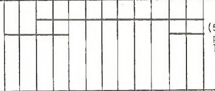
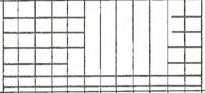
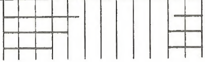
6803 Bluff Bench	C	320	---	21	--	16	--	63	63 Cattle 1 Deer		64 (30% public	33 lands)	0
6805 Brown Canyon	M	900	---	20	50	30	--	--	15 Cattle 2 Deer		60	61	0
6846 Bug-Squaw	I	18,130	2,220 dw	7	21	56	4	12	314 Cattle 100 Deer		1,305 (Utah only)	991 (Utah only)	0
6806 Bulldog	C	7,210	--- Aq/Rip 5 miles	6	2	86	2	4	62 Cattle 40 Cattle 7 Deer		368	316	0
6808 Cave Canyon	I	15,035	14,370 dw Aq/Rip 1 mile	11	26	24	39	--	490 Cattle 10 Horses 250 Deer 3 Deer		3,249	1,895	0
4827 Church Rock	C	160	---	36	--	64	--	--	10 Cattle 5 Deer 4 Antelope		60	34	0
6836 Comb Wash	I	65,610	--- Aq/Rip 56 miles	17	15	45	20	3	527 Cattle 76 Deer 1 Deer		3,961	2,870	0

Allotment	Category	Allotment Acreage[a]		Ecological Condition by Percentage of Allotment					Number and Class of Livestock and Wildlife Species[e]	Season of Use												Active Preference (AUMs)[f]	5-Year (3/79-2/84) Average Use (AUMs)[g]	Total Nonuse Past 5 Yrs (Years)
		Noncritical	Critical[b]	RO/BD[d]	Early Seral	Mid Seral	Late Seral	Climax		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
6838 Corral	C	200	---	--	--	77	23	--	8 Cattle					—	—	—						16	16	3
6811 Cross Canyon	I	24,830	400 dw Aq/Rip 7 miles	8	29	57	6	--	514 Cattle	—	—	—	—	—						—	—	3,600	2,289	0
									56 Deer	—	—	—	—							—	—			
									3 Deer	—	—	—	—	—	—	—	—	—	—	—	—			
6812 Devils Canyon	M	9,560	--- Aq/Rip 9 miles	6	66	28	--	--	53 Cattle						—	—	—	—				212	195	0
									30 Deer	—	—	—	—							—	—			
6813 Dodge Canyon	C	1,520	---	5	--	35	60	--	20 Cattle					—	—	—	—	—	—			110	100	4
									21 Deer	—	—	—	—							—	—			
6814 Dodge Point	C	200	---	7	41	19	33	--	6 Cattle						—	—	—	—	—			30	30	0
									1 Deer	—	—	—	—							—	—			
4804 Dry Farm	C	640	---	--	--	93	7	--	81 Cattle					—								27	34	0
									3 Deer	—	—	—	—							—	—			

4820 Dry Valley-Deer Neck	M	2,660	970 af	4	54	42	--	--	330 Cattle 31 Deer 2 Antelope		1,286 (73% public lands)	1,008	0
4814 East Canyon	I	4,770	--- Aq/Rip 8 miles	4	44	52	--	--	265 Cattle 44 Deer		1,191	1,045	0
6815 East League	M	16,090	--- Aq/Rip 9 miles	12	6	12	36	34	352 Cattle 1 Deer 6 Deer		2,463	1,800	0
4810 East Summit	C	200	---	--	--	95	--	5	73 Cattle 1 Deer		33 (5% public lands)	32	0
4811 Hart Draw	I	64,610	15,840 dw dbs Aq/Rip 41 miles	30	4	48	16	2	308 Cattle 1,088 Deer 1 Antelope 5 Elk 50 Bighorn		2,460	2,359	0
4825 Hart Point	1	3,385	17,140 dw	34	--	66	--	--	360 Cattle 314 Deer		1,080	478	0
6816 Horse-head Canyon	C	3,435	1,560 dw	6	14	32	47	1	26 Cattle 57 Deer		144	83	2

Allotment	Category	Allotment Acreage[a]		Ecological Condition[c] by Percentage of Allotment					Number and Class of Livestock and Wildlife Species[e]	Season of Use												Active Preference (AUMs)[f]	5-Year (3/79-2/84) Average Use (AUMs)[g]	Total Nonuse Past 5 Yrs (Years)
		Noncritical	Critical[b]	RO/BD[d]	Early Seral	Mid Seral	Late Seral	Climax		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
4813 Hurrah Pass	I	14,075	--- Aq/Rip 14 miles	30	6	38	18	8	47 Cattle 10 Horses 3 Deer 10 Bighorn													262	246	0
4815 Indian Creek	I	157,850	32,500 dw 44,300dbs Aq/Rip 64 miles	24	20	39	12	5	1,065 Cattle 1,600 Deer 8 Deer 6 Deer 5 Elk 530 Bighorn													8,518	5,171	0
4822 Indian Rock	I	2,730	--- Aq/Rip 1 mile	31	49	18	2	--	149 Cattle 10 Deer													895	217	0
6818 Johnson Creek	C	870	---	5	--	95	--	--	21 Cattle 1 Deer													90	91	0
6839 Laws	C	200	---	20	51	29	--	--	30 Cattle 1 Deer													5 (2% public lands)	5	0
6833 Lake Canyon	I	441,640	10,530 dw 158,630dbs Aq/Rip 50 miles	38	7	20	24	11	600 Cattle 12 Horses 120 Deer 30 Deer 250 Bighorn													4,895	4,777	0

6819 Little Boulder	M	3,920	2,620 dw Aq/Rip 1 mile	7	6	60	21	6	48 Cattle 75 Deer	280 (73% public	New Allotment lands)	0
4801 Lone Cedar	I	16,590	1,400 dw af	33	--	67	--	--	296 Cattle 236 Deer 2 Antelope	1,483	1,108	0
6820 Long Canyon	C	2,230	---	7	39	21	.33	--	28 Cattle 31 Deer	140	116	1
6821 Lyman	C	300	---	16	62	--	22	--	50 Cattle 6 Deer	6 (1% public	6 lands)	0
4819 Mail Station	M	5,480	3,770 af	9	2	89	--	--	241 Cattle 3 Deer 23 Antelope	1,446	1,187	0
6822 McCracken	I	15,320	--- Aq/Rip 12 miles	38	--	14	12	36	211 Cattle 4 Deer	950	602	2
6823 Montezuma Canyon	I	5,670	23,770 dw Aq/Rip 16 miles	11	40	24	18	7	265 Cattle 300 Deer	1,900	1,581	0

Allotment	Category	Allotment Acreage[a]		Ecological Condition[c] by Percentage of Allotment					Number and Class of Livestock and Wildlife Species[e]	Season of Use (Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec)	Active Preference (AUMs)[f]	5-Year (3/79-2/84) Average Use (AUMs)[g]	Total Nonuse Past 5 Yrs (Years)
		Noncritical	Critical[b]	RO/BD[d]	Early Seral	Mid Seral	Late Seral	Climax					
4806 Monticello Cowboy	M	4,020	--- Aq/Rip 6 miles	8	11	81	--	--	148 Cattle 15 Deer		814	618	0
6825 Monument	I	24,110	9,410 dw Aq/Rip 27 miles	7	16	50	24	3	196 Cattle 200 Deer		1,150	434	0
6824 Owens Dugout	C	2,160	---	25	--	55	20	--	47 Cattle 1 Deer		275	265	0
6845 Pearson Point	M	830	1,580	6	9	55	30	--	25 Cattle 20 Deer		125 (50% public lands)	100 2-year avg. Allotment established by split from another allotment 3/1/82.	0
6827 Perkins Brothers	I	108,960	--- Aq/Rip 58 miles	7	1	22	53	17	1,076 Cattle 16 Horses 30 Horses 24 Deer 4 Deer 20 Bighorn		7,579	3,411	0
4807 Peters Canyon	C	600	---	--	--	100	--	--	45 Cattle 30 Deer 3 Elk		90 (33% public lands)	50	0

4805 Peters Point	I	4,000	--- Aq/Rip 1 mile	--	60	10	15	15	30 Cattle 124 Deer 3 Elk		180	135	0
6841 Piute Knoll	C	160	---	--	--	50	50	--	120 Cattle 1 Deer		30 (4% public lands)	25	0
6842 Rogers	C	40	--	10	30	60	--	--	16 Cattle 1 Deer		7 (10% public lands)	0	5
6847 Roundup Corral	C	70	--	--	--	77	23	--	60 Cattle		8	4	0
6724 Sage Flat	C	840	---	--	--	100	--	--	200 Cattle		13 (6% public lands)	13	0
6716 Sage Grouse	C	320	---	--	--	100	--	--	150 Cattle		7 (6% public lands)	7	0
6834 Slick-horn	I	132,810	--- Aq/Rip 29 miles	7	27	31	25	10	219 Cattle 5 Horses 128 Deer 50 Bighorn		1,795	1,716	0

Allotment	Category	Allotment Acreage[a]		Ecological Condition[c] by Percentage of Allotment					Number and Class of Livestock and Wildlife Species[e]	Season of Use												Active Preference (AUMs)[f]	5-Year (3/79-2/84) Average Use (AUMs)[g]	Total Nonuse Past 5 Yrs (Years)
		Noncritical	Critical[b]	RO/BD[d]	Early Seral	Mid Seral	Late Seral	Climax		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
4824 South Canyon	C	5,880	---	--	--	97	3	--	60 Cattle					—	—	—	—	—	—	—		117 (30% public lands)	109	0
									14 Deer	—	—	—	—							—	—			
4823 Spring Creek	I	1,760	---	--	--	92	--	8	29 Cattle					—	—	—	—	—	—			172	90	0
									2 Horses					—	—	—	—	—	—					
									2 Deer	—	—	—	—							—	—			
4812 Spring Creek West	I	1,360	---	--	--	100	--	--	38 Cattle						—	—	—	—	—			150	152	0
									2 Deer	—	—	—	—							—	—			
6828 Squaw Canyon	I	10,200	---	6	24	66	4	--	120 Cattle	—	—	—	—	—						—	—	789	74	3
									10 Deer	—	—	—	—							—	—			
4831 State Line	C	240	---	--	--	100	--	--	25 Cattle	—	—									—	—	16 (20% public lands)	16	0
									1 Deer	—	—	—	—							—	—			
6830 Stevens	C	520	---	10	90	--	--	--	48 Cattle	—	—	—	—	—	—	—	—	—	—	—	—	60 (10% public lands)	43	0
									2 Horses	—	—	—	—	—	—	—	—	—	—	—	—			
									1 Deer	—	—	—	—							—	—			

4818 Summit Canyon	C	1,120	---	--	--	100	--	--	20 Cattle 3 Deer	39	40	0
6831 Tank Bench-Brushy Basin	I	83,820	10,100 dw Aq/Rip 41 miles	19	10	42	19	10	697 Cattle 580 Deer 8 Deer	5,457	4,072	0
4802 Tank Draw	I	3,720	5,410 af	9	8	83	--	--	426 Cattle 20 Deer 1 Deer 18 Antelope	2,130	1,705	0
6844 Texas-Muley	I	67,730	--- Aq/Rip 2 miles	9	21	66	--	4	274 Cattle 4 Horses 61 Deer 2 Bighorn	1,795	1,504	0
4817 Upper East Canyon	C	680	---	--	--	100	--	--	20 Cattle 1 Deer	18 (15% public	18 lands)	0
4803 Vega Creek	C	440	---	--	--	100	--	--	174 Cattle 1 Deer	80 (50% public	69 lands)	3
6832 Verdure Creek	C	1,490	1,100 dw	8	3	36	53	--	42 Cattle 18 Cattle 54 Deer	118 (35% public	103 lands)	0

Allotment	Category	Allotment Acreage[a]		Ecological Condition[c] by Percentage of Allotment					Number and Class of Livestock and Wildlife Species[e]	Season of Use												Active Preference (AUMs)[f]	5-Year (3/79-2/84) Average Use (AUMs)[g]	Total Nonuse Past 5 Yrs (Years)
		Noncritical	Critical[b]	RO/BD[d]	Early Seral	Mid Seral	Late Seral	Climax		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
6837 White Canyon	I	47,500	90,210dbs	16	2	35	32	15	450 Cattle	—	—	—	—	—	—	—	—	—	—	—	—	5,544	3,572	0
									12 Horses	—	—	—	—	—	—	—	—	—	—	—	—			
									56 Deer	—	—	—	—							—	—			
									10 Deer	—	—	—	—	—	—	—	—	—	—	—	—			
									190 Bighorn	—	—	—	—	—	—	—	—	—	—	—	—			
									10 Elk	—	—	—	—	—	—	—	—	—	—	—	—			
6840 White Mesa	I	45,210	6,720 dw Aq/Rip 15 miles	11	28	38	20	3	755 Cattle	—	—	—	—	—							—	4,531	2,741	0
									708 Deer	—	—	—	—							—	—			
									3 Deer	—	—	—	—	—	—	—	—	—	—	—	—			

[a] Allotment acreages include GCNRA acres.

[b] Critical acreage denotes riparian areas (Aq/Rip), deer winter range (dw), desert bighorn sheep lambing and rutting areas (dbs), and antelope fawning areas (af).

[c] Ecological condition is the present state of a vegetative community in relation to climax; it does not denote wildlife habitat condition.

[d] RO/BD = rock outcrop/badlands.

[e] Livestock numbers were calculated by dividing preference AUMs by the season of use (number of months) and by the percent of public land in the allotment. Wildlife numbers were adjusted from prior stable population estimates in cooperation with UDWR.

[f] AUM = animal unit month (the amount of forage necessary to feed one cow or five sheep for 1 month).

[g] Average use figure does not include years of total nonuse, but does include years of partial nonuse.

Springs and seeps are likewise dependable water sources, but in many cases the production is inadequate for the livestock that could use the area. Many of the more productive springs have been developed to collect water for livestock use. In many instances these springs and seeps occur in canyons and are inaccessible to livestock because of the steep canyon walls.

The availability of surface water in streams or drainages usually corresponds to the season of the year. Many drainages run water only during winter or spring and are dry during the remainder of the year. Streams with year-round water are uncommon. Some canyon rims are too steep to allow livestock access to stream water without trail construction. Some areas have no surface water and can be used by livestock only on snow or when water is hauled to these areas. The overall effect on grazing of the presence and absence of water is to create heavy livestock utilization of forage near the water and little or no use in areas without water.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

National Laws

The purpose of the Taylor Grazing Act was to stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; and to stabilize the livestock industry dependent upon the public range.

FLPMA directs the Secretary to determine which lands remain available for domestic livestock grazing. It also requires that the public lands be managed in a manner that will provide food for domestic animals. FLPMA also mandates multiple use management on a sustained yield basis.

PRIA provides policy and commitment to manage, maintain, and improve the condition of the public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives.

P.L. 92-593 (October 27, 1972) established the GCNRA and mandated the administration of grazing in the recreation area by BLM.

Other laws that indirectly affect management of grazing resources include the Endangered Species Act of 1973, the Antiquities Act of 1906, and the Archaeological Resources Protection Act of 1979.

Executive Orders

EO 11987 restricts the introduction of exotic flora and fauna by all executive agencies, and provides for the introduction of exotic species in certain limited circumstances.

Regulations

The BLM Grazing Regulations, 43 CFR 4100, provide uniform guidance for the administration of grazing.

Bureau Manuals

1603	The Bureau's policy is to provide forage to help meet needs of the nation, to help stabilize the economy of the livestock industry, individual users, and dependent communities.
4100-4400	Grazing administration manual and handbooks.
7311 & 7400	Criteria and guidelines for chemical and mechanical weed and brush control and reseeding.

Organic Act Directives

OAD 77-75	Directs that range improvement appropriations (8100 and 8200) may be used to fund wildlife projects, as long as the project contributes to improvement of rangeland condition.

Instruction Memorandums

IM 76-455	Guidance for Economic Analysis for Grazing EIS.
IM 78-299	If requirements of Executive Order 11987, Exotic Organisms, are met, exotic species will still not be introduced on public lands, nor will Bureau personnel assist in introducing exotics, until: (a) BLM Manual 6820 has been complied with; (b) it has been determined that no adverse impacts will occur to native species or ecosystems and introduced species will be confined to the ecosystem into which introductions are being considered; and (c) EAs are prepared.
IM 82-292	Final grazing management policy.

Memorandums of Understanding

The umbrella MOU between BLM and NPS (September 4, 1984) establishes grazing management responsibilities in units of the national park system and in GCNRA.

Supplement No. 1 to an MOU between the NPS USO and the BLM USO (September 26, 1973) pertains to grazing management in GCNRA.

RESOURCE ALLOCATIONS

BLM administers grazing on units called grazing allotments. These were established during the adjudication period in the early and mid 1960s. Allotment boundaries are defined by topography and fences. An allotment is assigned for use by a single permittee or a group (sometimes organized as a grazing association).

A permittee may not graze livestock on BLM lands without authorization. This authorization is an annual grazing license or 10- year-term grazing permit which is renewable annually to the same grazing permittee, so long as he abides by the grazing regulations.

A permittee continues to use the same allotment year after year unless he (1) loses his grazing privilege because of serious infractions of the grazing regulations; (2) transfers his grazing privilege to another permittee; or (3) leases or sells his base property.

Grazing privileges are attached to base property (private land used as a base for the grazing operation) and stay with the base property through change of land owners unless the privileges are transferred off the base property.

Allotment boundaries can be changed to combine allotments or parts of allotments due to transfer of grazing privileges or changed to correspond to natural or cultural barriers to livestock. This is an administrative agreement and is not done through the planning process.

Allotment Management Categories

All grazing allotments in the SJRA are categorized to establish priorities for distributing available funds and personnel to achieve cost-effective improvement of rangeland condition and production. This process is called selective management and will put the emphasis (work force and dollars) on those allotments with the most need and where the most positive benefit could result from public investment. The resource area groups similar allotments into one of three management categories based on the following criteria:

(1) Maintain (M): (a) resource production potential is moderate to high, present production is near potential; (b) no serious resource use conflicts exist; and (c) opportunities may exist for positive economic return from public investments.

(2) Improve (I): (a) resource production potential is moderate to high, present production is low to moderate; (b) serious resource use conflicts are present; and (c) opportunities exist for positive economic return from public investments.

(3) Custodial (C): (a) resource production potential is low, present production is near potential; (b) limited resource use conflicts may exist; and (c) no opportunities exist for positive economic return from public investments.

The current management category for each allotment in SJRA was shown in Table 4322-1.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

The SJRA administers grazing on 69 allotments held by 58 permittees (see the Grazing Allotments overlay and table 4322-1). Approximately 17,300 acres in the Peters Canyon and East Canyon areas have been allotted to wildlife (see the grazing allotments overlay).

Base properties for BLM grazing operations are generally private lands in San Juan County, Utah with some in southwestern Colorado. In some instances, leased State of Utah lands are utilized as base property.

The Monuclo and Willow Creek allotments are entirely in Colorado, but are managed by Utah because of their proximity to the SJRA office and because the operator resides in the SJRA. They were included in the San Juan/San Miguel RMP/EIS completed by BLM's Montrose District, Colorado in December 1984. Two other allotments straddle the state line, with Utah responsible for grazing management of the Bug-Squaw Canyon Allotment and Colorado responsible for the Squaw Canyon Allotment (BLM, 1982). However, for planning purposes, the state line was used as the boundary, so the Colorado portions of both allotments were included in the San Juan-San Miguel RMP/EIS. The Utah portions of these allotments are included in the San Juan RMP/EIS.

The SJRA also administers grazing on the Hurrah Pass Allotment, part of which is in the adjoining Grand Resource Area of the Moab District, and on the East Summit Allotment which is entirely in the Grand Resource Area. Both of these allotments are included in the San Juan RMP/EIS.

The BLM has the responsibility to administer grazing within GCNRA. This responsibility was given in Public Law 92-593 and clarified with later MOUs between the two agencies (BLM and NPS, 1973 and 1984).

All allotments in this resource area except one are presently used by cattle (see table 4322-1). Season of use on most allotments is fall, winter and spring. Twenty-one allotments, or 3 percent of the resource area allotted (on both BLM and GCNRA) acreage, have summer use. Four allotments, or 11 percent of the resource area allotted acreage, are licensed for year-round use. These are generally smaller allotments of less than 2,600 acres, except for one which is approximately 226,000 BLM and GCNRA acres.

All of the allotments were adjudicated in the 1960s based on range surveys conducted at that time. This generally resulted in a reduction in active preference of 10 to 50 percent on about half the allotments. Four allotments in the old Montezuma Planning Unit actually received increases in active preference of 20 to 250 percent. A few allotments were proposed for reductions, but these were never made (Perkins Brothers and Indian Rock Allotments). Spring grazing was generally not eliminated by adjudication. At least one allotment (Lake Canyon) with summer grazing had that season eliminated in the early 1970s.

All allotments in the SJRA have been categorized. Table 4322-2 summarizes allotment categorization.

Ecological Condition and Trend

Ecological condition of each allotment was shown in Table 4322-1. Monitoring

TABLE 4322-2

Allotment Categorization

Category	No. Allotments[a]	Percent of Resource Area
M	8	3
I	29	95
C	30	2
Total	67	100

NOTE: Allotment categorization is discussed in ongoing contacts with permittees. All permittees will be contacted by the end of FY 1986. Permittee concerns have been resolved on a case-by-case basis and will be reflected in the categories shown.

[a] Does not include the two allotments in Colorado managed by Utah.

studies are being established on all allotments so that trend can be determined over the next 5 or more years. Ecological site trend will be used to judge the need for adjustments to livestock numbers.

Allotment Management Plans

There are nine AMPs in the resource area that were written in the late 1960s and early 1970s. Seven are no longer followed to the letter of the plan because of changes in land status and operators, limited project funding, moratoriums against vegetation treatments, and the fact that some plans have been found to be unworkable. Informal changes have been made to compensate for these situations, but the AMPs have not been formally revised. AMP status is shown in table 4322-3.

Range Improvements

Land treatment and management facilities in the area serve to provide additional livestock forage; make unusable areas usable (addition of water and access); provide for more uniform distribution of livestock; provide for more intensive management, including rest periods for improved ecological condition; and aid in control and handling of livestock (cross-reference: Land Treatments and Management Facilities, Part I).

These facilities have been funded and constructed either (1) entirely by the grazing permittees, (2) entirely by BLM, (3) with use of Grazing Advisory Board funds (a 12.5 percent amount derived directly from paid grazing fees), or (4) by a combination of any of these sources.

Generally the grazing permittees have maintenance responsibility for most structural improvements such as fences, wells, and reservoirs, while BLM has maintenance responsibility for nonstructural improvements such as seedings. This type of maintenance assignment was stated in the Bureau's Final Rangeland Improvement Policy (BLM, 1982b).

Approximately 5,200 acres of existing seedings have been treated or maintained with prescribed fire or herbicides, but no new seedings have been initiated since 1972. This is the result of a moratorium on chainings (cross-reference: Forest Management, Part II) issued by Utah BLM in 1971 and the 1974 Natural Resources Defense Council lawsuit (NRDC, 1974) which forbade any new land treatments prior to completion of an EIS. The EIS prepared as part of this RMP will fulfill this requirement.

During this time, grazing permittees have still been interested in completing chainings and seedings to improve the quantity and quality of livestock forage. In some cases, permittees have been willing to fund these projects at their own expense.

Transportation

Trailing of livestock is not as common as it once was. Many operators now truck their livestock rather than trailing them. Trailing use that now occurs is by 8 or 10 operators trailing 15 to 25 miles from private lands to grazing allotments and returning. Most trailing is along county roads and state highways; much of it along U.S. 191 from the Monticello area to Dry Valley. There are no formally designated stock trailways in the resource area.

Interim Management Policy

IMP conflicts with livestock management in that certain range improvements that would permanently impair the area's suitability for wilderness designation are not allowed. Livestock grazing is allowed under IMP where grandfathered. All grazing in WSAs in SJRA is grandfathered; grazing in ISAs is not.

Planning Guidance

All four MFPs give some basic direction for management of grazing resources. They indicate that BLM management should act to improve range condition and provide for an increase in forage production through development of grazing systems, land treatments, and land developments.

These planning goals are still valid. However, BLM cannot identify specific management programs until completion of ecological site trend determinations after monitoring.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area for SJRA grazing operations. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County.

For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

Agriculture was the region's major economic base in the late 1800s and early 1900s. Since the early 1900s, agriculture has declined in relative importance. Agriculture remains a stable industry and is the county's second largest source of employment (see table 4322-4). In 1982 agriculture directly accounted for 402 jobs (11 percent of local employment) and $1,694,000 of personal income earned in the county (3 percent of local income)(BEA, 1984a; BEA, 1984b).

Livestock is the county's major agricultural product, accounting for 55 percent of all agricultural sales in 1982 (USDC, 1984).

The SJRA supplies forage for livestock operators not only in southeastern Utah, but also some in southwestern Colorado (Montezuma, Dolores, San Miguel, and Montrose counties). Ninety percent of the operators live in San Juan County, and the remaining 10 percent live in southwestern Colorado. Although

TABLE 4322-3

Allotment Management Plan Status
(July 1985)

AMP	Year Signed	Proposed System	Implemented? Yes	Implemented? No	If Not, Why?	Still Needed
Peters Point	1970	4-pasture rest-rotation grazing system based on proposed range improvements		X	proposed improvements not constructed; permittee lost control over private lands in one pasture	more simplified grazing system, additional water developments, and fencing; revision of plan
Indian Creek	1970 1976	4 rest-rotation systems in 4 pasture complexes; range improvements (waters and fences)		X	not approved because of problems with fencing along Canyonlands National Park; lack of funding for proposed water projects; revision of grazing EIS boundaries	maintenance of existing seedings on Dark Canyon Plateau; water developments in lower Indian Creek area; revision of plan
Comb Wash	1969	2-pasture complex deferred rotation grazing system	X			water developments on Perkins Point, Snow Flat, and Little Baullies; re-treatment of west side of the Little Baullies seeding
Lake Canyon	1970	5-pasture deferred rotation system		X	not fully operational because range improvements have not been completed	water developments in many areas; chaining and seeding of 8,000 acres in Grand and Harmony Flats; chaining on Maverick Point; resolution of range improvement dispute with GCNRA; revision of plan
Tank Bench-Brushy Basin	1971	6-pasture deferred grazing system		X	not fully operational because all range improvements have not been completed	water development in Black Mesa; maintenance of seedings in Brushy Basin area; resolution of problem with scattered unfenced Ute lands; revision of plan to include Black Mesa pasture

White Canyon	1969	year-round grazing on a deferred rotation system		X	parts were found to be unworkable (drifting cattle through Gravel Canyon to winter pastures); water developments in Gravel Canyon not allowed because of potential conflict with bighorn sheep	maintenance of seedings in transition and summer use areas; additional fencing and water developments on Deer Flat; reservoirs on Gravel Canyon bench; revision of plan
East League	1966	7-pasture rest-rotation grazing system	X			water developments in Chimney Draw, Highway, Cow Canyon, and South Horn (latter 3 pastures are mostly State land); revision of plan to include Horse Canyon pasture
McCracken Wash	1967	3-pasture deferred rotation grazing system	X			additional waters to replace waters that have become too salty for stock use in Bucket Canyon and additional waters in upper McCracken Wash
White Mesa	1968	4-pasture complex deferred rotation grazing system	X			water development on Mustang Mesa, Black Mesa, and Westwater seeding; maintenance of Westwater and Mustang seedings; revision of plan

TABLE 4322-4

San Juan County Historical Agricultural Statistics

Year	Land Acreage in Farms	Agricultural Sales	Livestock Numbers	Employment	
				Jobs	% of County Total
1959	424,986	$2,845,000			
1964	576,599	2,335,000			
1969	491,057	3,184,342	16,064	397	16
1974	507,196	5,986,000	26,682	400	12
1978	411,693	6,784,000	23,082	418	11
1982	362,921	8,367,000	24,702	402	11

NOTE: Includes both wage and salary jobs and number of proprietors

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Sources: USDC, 1977; USDC, 1981; USDC, 1984; BEA, 1984a; BEA, 1984b.

there are 58 licensed operators, several appear to have combined operations with free exchange of cattle. Fifty-two active and independent livestock operators have been identified for ranch budget analysis. Of the 51 cattle operators, 27 have a herd size of under 100 head and 24 have a herd size of greater than 100 head. There is one sheep operator (see table 4322-5).

Of the 52 independent operators who graze livestock in the SJRA, 34 (65 percent) have been identified as full-time operators, a proportion which is significantly higher than the state's 44 percent average proportion of full-time farmers in the farm sector (USDC, 1984).

Livestock operators who use public rangeland forage in the SJRA and reside in the county account for 70 percent of the county's livestock production. On the average, these livestock operators depend on public rangeland forage for 40 percent of their feed needs. Clearly, public lands in the SJRA are an important source of forage for livestock operators in the area.

The majority of livestock operators have cow-calf operations. Generally, cows are calved in early spring, and the calves are then sold in late fall. The SJRA plays an important role in maintaining the cow herd during the winter and in providing nutritious forage during the spring when cows are calving. Average ranch sources of feed and dependency rates by season and operator grouping are presented in tables 4322-6 and 4322-7.

Few alternative sources of forage are available to cattle operators during the winter and early fall. Base properties are not producing forage during this period. The only alternative source of forage is that which is left on private lands in the fall or stored in the form of alfalfa and grain hay. Depending on the weather and elevation, privately owned pastures generally do not produce forage in the region until mid June. Use of this forage during green out delays the first harvest, and can cause bloating of cows.

Ranch budgets have been developed for four livestock groupings. Each ranch has a unique set of characteristics affecting its operation that cannot be fully represented by models of typical ranches. However, data from these typical ranch budgets can be used to estimate aggregate costs, returns, hired labor, and ranch values. These aggregate statistics are summarized in table 4322-8 for all livestock operators.

The budgets suggest that over 100 head of cattle are generally needed to support a full-time operator. With existing economic conditions, most operators, particularly those with a low debt load, can earn a return above their cash cost. However, returns to family labor and investment are lower than existing market rates of return, and returns to risk and management are generally negative. Although these conditions vary, depending particularly on management ability and debt loads, there does not appear to be much economic incentive to stay in the livestock business. Escalating farm real estate values between 1970 and 1981 have been contributing to fair market returns; however, this economic incentive has diminished as farm real estate values have remained static since 1981 (Drabenstott and Duncan, 1984).

TABLE 4322-5

Base of Operation Location and Aggregate Herd Size for Operators Using SJRA Public Rangeland

Base of Operations	Number of Operators	Aggregate Herd Size
Cattle		
San Juan County	46	9,000
Southwestern Colorado	5	1,500
Total	51	10,500
Sheep		
San Juan County	0	0
Southwestern Colorado	1	110
Total	1	110

Source: BLM Records.

TABLE 4322-6

Operator Dependency Rates by Grouping

Number of Operators

Dependency Rate (%)	Cattle Herd Size Under 100	Cattle Herd Size Over 100	Cattle Yearlong BLM	Cattle Summer BLM	Sheep	Total
1 - 20	4	4	3	6	0	17
21 - 40	2	7	1	5	1	16
41 - 60	3	9	2	1	0	15
61 - 80	0	2	0	1	0	3
81 - 100	0	0	1	0	0	1
						52

Source: BLM Records

TABLE 4322-7

Dependency on SJRA Forage by Season of Use and by Source of Forage

	CATTLE		SHEEP	
Season	Average Use (AUMs)	Dependency[a] (%)	Average Use (AUMs)	Dependency[a] (%)
January	7,580	70	63	NA
February	7,471	70	63	NA
March	7,525	70	63	NA
April	7,362	70	63	NA
May	5,726	55		0
June	1,418	15		0
July	872	10		0
August	872	10		0
September	818	10		0
October	2,563	25		0
November	5,180	50		0
December	7,143	70	64	NA
Total	54,530	40	[b]314	NA

[a] Dependency represents the percentage of total feed requirements supplied by a given source; in this table, SJRA public lands.

[b] Numbers are not additive because of rounding.

TABLE 4322-7 (Concluded)

Dependency by Source	Cattle Herd Size Under 100 (Percent)	Cattle Herd Size Over 100 (Percent)	Cattle Yearlong BLM (Percent)	Cattle Summer BLM (Percent)	Sheep (Percent)
SJRA	38	45	50	45	64
Other public range	2	4	2	4	NA
U.S. Forest Service	20	25	10	10	NA
State	3	4	3	4	NA
Leased	7	2	5	7	NA
Private	30	20	30	30	NA
Range and pasture	10	4	10	10	NA
Hay	16	12	16	16	NA
Residue	3	2	3	3	NA
Supplement	1	1	1	1	NA

Source: BLM Records.

TABLE 4322-8

Preliminary Aggregate Costs and Returns for all Operators Grazing in the SJRA (1984 first quarter dollars)

	Cattle	Sheep	Total
Gross revenues	$ 2,665,740	$ 8,089	$ 2,673,829
Cash cost	2,020,805	3,044	2,023,849
Returns above cash costs	644,935	5,045	660,980
Returns to family labor and investments	147,630	4,232	151,862
Return to risk and management	-2,099,790	-2,773	-2,102,563
Ranch Value	$26,000,000	$81,000	$26,081,000

Source: BLM Records.

Based on the ranch budgets for the direct effect, and the indirect and induced effect derived from a county economic model, it is estimated that local operators who use SJRA forage generate $101,000 income (1.5 percent of total county income) and 176 jobs (4.8 percent of total county employment)(see tables 4322-9 and 4322-10).

Although BLM does not recognize a capitalized value for grazing preferences, the market does recognize such a capitalized value whenever grazing fees are lower than their true economic value (USDA and USDI, 1977). Recent permit sales in the area have ranged from $50 to $75. Local private lease rates for forage also suggest that grazing fees are lower than their true economic worth (Tittman and Brownell, 1984).

There is some uncertainty as to how much of a permit's value, if any, is capitalized in an operator's base property when it does not represent actual ranch capacity. Although most operators have purchased their grazing privileges from other operators, the uncertain nature of both future grazing privileges and grazing fees after 1985 may have reduced or eliminated much of the previously capitalized value. If a permit's value is $60, and the entire permit value is capitalized in the ranch's value, then grazing privileges in the SJRA account for $4,745,880 or 20 percent of the aggregate ranch value of operators using SJRA forage.

Most credit institutions base loans on the rancher's ability to repay. The repayment ability is usually measured by the rancher's likely future income. Credit institutions also require a security on their loans, which is often based on the base property's appraised value. Although other factors are of far greater importance, the appraised value occasionally includes grazing privileges on public lands. If the ability to repay a loan is adequate, the appraised value could limit the size of the loan. Since grazing privileges on public land can also affect a rancher's likely future income, changes in grazing privileges could also affect rancher's ability to obtain loans.

Some of the governmental cost related to managing livestock in the SJRA also contributes to local sales, and therefore to local income and employment. The resulting income and employment effects, which are insignificant at the county level, are presented in table 4322-11.

In addition to the income and employment effects, livestock production within San Juan County affects both revenues and costs of several local taxing jurisdictions. Livestock related sales and property taxes brings an estimated $89,000 in revenues to local taxing jurisdictions see (table 4322-12). Livestock production associated with SJRA forage generates approximately $62,000 in revenues to local taxing jurisdictions. These figures are thought to be conservative. Livestock related jurisdictional costs could not be delineated or quantified.

TABLE 4322-9

Preliminary Aggregate Costs and Revenues for Operators Grazing in the SJRA and a Local Base of Operations (1984 first quarter dollars)

Gross revenues	$ 2,284,920
Cash cost	1,722,690
Returns above cash cost	562,230
Returns to family labor and investments	126,540
Returns to risk and management	1,799,820
Ranch value	$23,000,000

Source: BLM Records.

TABLE 4322-10

Total Local Income and Employment Generated by Livestock Operators in San Juan County and the SJRA
(1982 first quarter dollars)

	Direct, Indirect, and Induced Effects					
	San Juan County			SJRA		
Industrial Sector	Earnings[b] (dollars)	Employment (jobs)	Percent of Total	Earnings (dollars)	Employment (jobs)	Percent of Total
Farm						
Livestock Production	859,118	186.4	46.4	601,383	130.5	32.5
Other	58,995	12.8	3.1	41,297	9.0	2.2
Private						
Mining						
Construction						
Manufacturing	44,070	3.1	3.1	62,957	2.7	2.2
Transport & Utilities	30,827	1.8	0.9	22,264	1.3	0.6
Wholesale	80,722	3.9	3-4	56,505	2.7	2-3
Retail	138,392	14.1	4.6	96,874	9.9	3.2
F.I.R.E.[a]	23,703	1.3	3-4	16,592	0.9	2-3
Services	130,295	10.3	2.6	91,207	7.2	1.8
Government[c]	34,606	2.6	0.3	24,224	1.8	0.2
Proprietor's[b]		13.7	5.7		9.6	4.0
Totals	1,392,165	249.5	6.8	100,662	175.6	4.8
Total Personal Income[b]						

[a] Finance, insurance, and real estate.

[b] Earnings include wage, salary, and proprietor's income; personal income also includes dividends interest and rents plus transfer payments and residential adjustments. Proprietor employment is not broken out by sector.

[c] Government sector figures only account for government enterprises such as the Post Office, and do not account for public administration.

Sources: BLM Records; USFS, 1982; BEA, 1984a; BEA, 1984b.

TABLE 4322-11

Local Importance of SJRA's Livestock Program Related Costs
(FY 1984, 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Program	Local Effect Income	Local Effect Employment
Public Administration	$159,894	$ 78,690	4.4
Other Sectors		32,026	1.8
Total	$159,894	$110,716	6.2

Source: BLM Records; USFS, 1982

TABLE 4322-12

Grazing Related Taxing District Revenues
(Calendar Year 1984 and Fiscal Year 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues due to Grazing Activities in	
					San Juan County	SJRA
Taxes	$3,543,909	$ 582,906	$ 7,530,196	$11,657,011	$ 89,000	$62,000
Licenses and Permits	2,853	10,714		13,567		
Intergovernment	2,595,259	924,897	6,847,000	10,367,156		
Charges for services	227,039	82,810	148,000	457,849		
Fines and forfeitures	131,661	56,626		188,287		
Miscellaneous	970,241	285,855	447,820	1,703,916		
Totals	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$89,000	$62,000

NOTE: Only taxes directly associated with the activity were assessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue sources are expected to be minor, these effects were not quantified. Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Yoakum, 1985; Smuin, Rich, and Marsing, 1984; Monticello, 1984; Utah Tax Commission, 1985; and Utah Foundation, 1985.

CONSISTENCY WITH NON-BUREAU PLANS

P.L. 92-593 (October 27, 1972) gave BLM the responsibility to manage grazing in GCNRA. This responsibility requires consultation with NPS prior to any range improvements or proposed changes in grazing use.

Conflicts have arisen in grazing administration (particularly proposed range improvements) due to the guidelines set forth in NPS's General Management Plan of November 21, 1979, the land use plan for GCNRA. This plan divides the recreation area into four different management zones with specific activity restrictions in each. These zones and their approximate acreages in the SJRA are shown in table 4322-13.

Grazing is allowed by GCNRA in all zones except the cultural zone and the developed areas within the development zone. As of 1984, grazing in the SJRA has been eliminated by BLM and NPS only in the Halls Crossing development area (approximately 1,540 acres or 0.2 percent of the total acreage in the Lake Canyon Allotment).

Grazing is allowed in three of the management zones, under the GCNRA management policy. However, grazing use in the natural zone is restricted.

In the natural zone motorized vehicles are not allowed, nor are developments that are not in harmony with the natural setting. Since most range improvements, such as water developments, require motorized vehicles for construction, they are not allowed, even though they may be harmonious with the natural setting. This policy has effectively blocked construction of proposed water developments on Wilson Mesa and hindered implementation of the Lake Canyon AMP.

DATA GAPS

Ecological site trend in the resource area has not been determined. Trend will be determined over the next 5 to 10 year period (1990 to 1995) with monitoring studies established on all allotments. These studies will consist of range trend, actual grazing use, utilization of key forage species and climate.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

Demand for livestock forage in the resource area could be considered to be any of the following:

(1) Average of past 5 years licensed use (54,844 AUMs). This figure is dependent on forage production and economics in any one year.

(2) Active preference (79,098 AUMs). This is that portion of the total grazing preference for which grazing may be authorized (licensed).

TABLE 4322-13

Glen Canyon National Recreation Area Management Zones (within SJRA boundaries)

Zone	Acres	Estimated[a] AUMs
Natural	137,115	1,370
Recreation and resource utilization	170,581	1,705
Development	4,935	50
Cultural	25	less than 1
Totals	312,656	3,125

[a] AUMs were estimated on the basis of an average 100 acres per AUM. Some areas are more or less productive than this figure indicates.

(3) Total of active and suspended preference (100,486 AUMs). Suspended preference is that portion of the grazing preference that exceeds the present available livestock grazing capacity.

Demand is directly related to and dependent on individual livestock operators. Some are content to maintain their herds at the level of the past 5 years average licensed use. Others want to increase their herds and allotment forage production. Based on SJRA range staff contacts with grazing permittees since 1975, approximately 30 percent of the grazing permittees, representing approximately 60 percent of the allotted acreage, are interested in herd increases and/or forage production increases through vegetation treatments and intensive grazing systems. This interest is partly evidenced by recent vegetation treatments on state lands. Since 1980, four grazing permittees have completed approximately 7,000 acres of chaining and seeding on 11 sections of state land.

Demand represented by average licensed use is currently being met in the resource area. Average licensed use and total active preference are shown in figure 4322-1.

The resource area probably produces forage to meet the demand for full active use, but an estimated 10 to 15 percent of this forage is unavailable to livestock due to inaccessibility and lack of stock water. Water developments would allow some of this forage to be used.

Present resource area forage production could not meet the demand represented by total active and suspended preference. To do so would require additional vegetation treatments, such as chainings and seedings, and intensive grazing management systems.

These estimates of the resource area's capability to meet demand for livestock forage are based solely on professional judgment of the resource area range staff and are not based on monitoring. Monitoring will be used to establish forage production figures based on livestock utilization of forage and range trend.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

An estimate of whether forage production will keep pace with demand over the next 15 years cannot be made until range trend is determined. If trend is downward, future demand cannot be met. If trend is upward or static, future demand may be met.

It may be determined that future demand could be met only with implementation of more intensive grazing systems and land treatments. Implementation of grazing systems on allotments with the potential to respond to intensive management would produce more livestock forage to help meet demand. Vegetative manipulations, such as chaining, plowing, and herbicidal applications, are possible on many areas to increase livestock forage production.

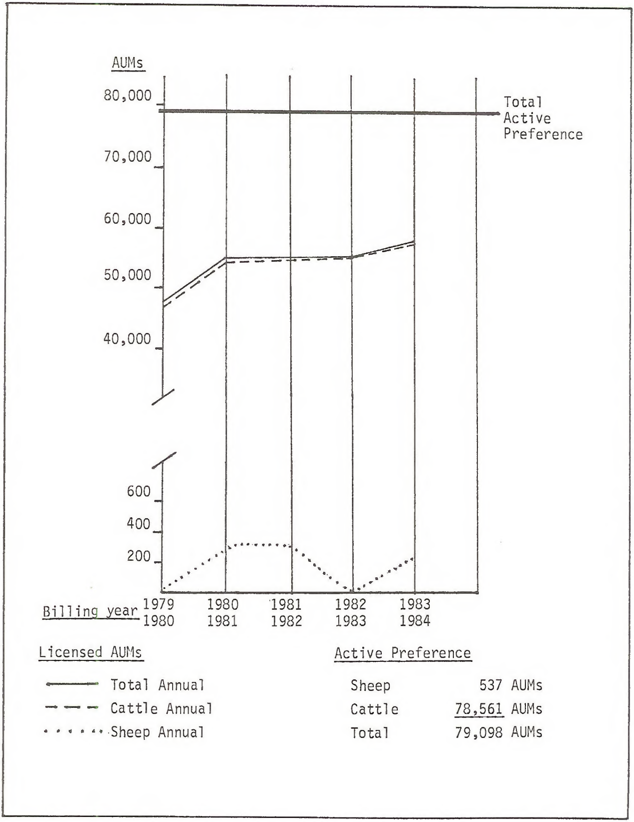


FIGURE 4322-1

Licensed Grazing Use, 1979 through 1984

Allotments with potential to respond to livestock manipulation techniques are shown in table 4322-14. Those with potential for vegetation treatments are shown in table 4322-15.

Future demand for public rangeland forage will depend upon the future demand for beef and on the future production relationship between beef and rangeland forage. Beef consumption reached on all-time high in 1967 (120 pounds per capita). It is doubtful that per capita consumption will ever reach previous highs, so beef consumption is likely to increase at the same rate as population growth (0.7 to 0.8 percent annually). Per capita consumption of sheep related products has been decreasing.

Although cattle numbers in the Western States have remained fairly stable for the past 10 years, use of public rangeland forage in the Western States and in the SJRA has been decreasing. Both more intensive use of private property and increased use of feedlots could be responsible. Consumer preference for leaner red meat is expected to decrease the use of feedlots and increase the demand for public rangeland forage. Although herd sizes in the Western States are not expected to increase further, the trend toward production of leaner meat may encourage more cow-yearling operations and thereby increase the demand for public rangeland forage, particularly during winter and spring. Demand for sheep rangeland forage is expected to remain static (Drabenstott and Duncan, 1982; National Cattlemen's Association, 1982).

CRITICAL THRESHOLDS

The critical threshold level of forage production, or the maximum level of forage production that could be utilized by livestock and still maintain sustained yield of vegetation, is difficult to quantify. This level is probably somewhere between the level of the past 5 years average licensed use and active preference. This critical threshold level will be quantified by monitoring over the next 5 to 10 years (1990 to 1995).

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

The condition of the range in the SJRA cannot be determined prior to evaluation of monitoring studies over the next 5 to 10 years (prior to 1990 or 1995). However, in some aspects, current grazing management does not appear to be adequate.

AMPs give specific guidance for management of a grazing allotment. Within SJRA, seven plans need revision, but this has been postponed over the past several years, pending completion of soil and vegetation inventories and the RMP/EIS.

Distribution of use has been uneven in some allotments. Problems are associated with access to livestock forage or availability of water. Where water is hauled in, the permittee sometimes has problems with vehicular access

TABLE 4322-14

Allotments With Potential to Respond to Livestock Manipulation Techniques

	Acres[a]
Alkali Canyon	23,910
Alkali Point	7,690
Big Indian	12,100
Black Steer	4,300
Bug-Squaw	20,300
Cave Canyon	29,400
Comb Wash	65,600
Cross Canyon	25,200
Dry Valley-Deer Neck	3,600
East Canyon	4,500
East League	16,100
Hart Draw	80,500
Hart Point	20,500
Hurrah Pass	14,000
Indian Creek	234,700
Lake Canyon	610,800
Lone Cedar	18,000
Mail Station	9,200
McCracken	15,300
Montezuma Canyon	29,400
Monticello Cowboy	4,000
Monument Canyon	33,500
Perkins Brothers	109,000
Slickhorn	133,000
Tank Bench-Brushy Basin	94,000
Tank Draw	9,100
Texas Muley	67,700
White Canyon	226,000
White Mesa	52,000
Peters Point	4,000
Total Acreage	1,977,400

NOTE: Includes fencing, water developments and grazing rotation schemes.

[a] BLM and GCNRA Acres.

TABLE 4322-15

Allotments with Potential for Vegetation Treatments

	Treatment Acres
Alkali Canyon	8,600
Alkali Point	3,000
Big Indian	700
Cave Canyon	1,700
Comb Wash	13,140
Cross Canyon	11,600
East Canyon	1,360
Hart Draw	4,760
Hart Point	3,080
Lake Canyon	22,160
Lone Cedar	4,460
Montezuma Canyon	2,800
Monument Canyon	6,700
Perkins Brothers	200
Peters Point	2,480
Slickhorn	68,060
Spring Creek	1,280
Spring Creek West	1,360
Tank Bench-Brushy Basin	14,780
Texas-Muley	38,540
White Canyon	32,890
White Mesa	21,160
	264,810

NOTE: Includes chaining, plowing, and application of herbicides. All allotments listed are in the "I" category.

within the allotment. Identification of specific problem areas within the allotments will be done at the RPS or AMP level after completion of the RMP/EIS.

Season of use is a concern in some allotments where grazing extends into the spring growing period (generally March 15 through May 30). These allotments are listed in table 4322-16. In those allotments with pastures and grazing systems, it is possible to rotate the use of these spring pastures so they receive periodic spring rest. In other allotments, spring rest can be obtained only by removing stock from the allotment or constructing fences to divide the allotment into pastures.

Continual spring grazing year after year causes a loss of plant vigor in perennial grasses by depleting carbohydrate reserves (Hormay, 1970). When reserves are insufficient to sustain the plant in future years, it loses vigor and may eventually die. This has occurred in many spring use pastures.

Season of use is also a concern in winter use pastures where shrubs are present. Unlike grasses, which store carbohydrate reserves in the roots, shrubs store reserves in the stems and leaves. Continual winter grazing of shrubs, even though they are dormant, decreases their reserves so they become less vigorous. Shrubs need to be rested from grazing to replenish carbohydrate reserves and regain vigor.

Reducing the number of livestock in an allotment or in a pasture is not a viable alternative to achieve rest for plants. Desirable livestock forage plants are grazed first regardless of the number of livestock in a parcel of range. Therefore, the desirable plants are not rested from grazing even with minimal stocking rates. If these and other plants do not receive periodic seasonal rest from grazing, their carbohydrate reserves will eventually be depleted, with a resultant decline in plant vigor and eventual death of the plant. Total forage production is therefore reduced, with a resultant loss of carrying capacity. Reductions in active grazing preference would then be necessary.

Grazing management in GCNRA is the responsibility of BLM. However, there is disagreement between BLM and NPS over what types of range improvements should be allowed and where. These points need to be resolved.

MANAGEMENT OPPORTUNITIES

Livestock management levels can be adjusted to improve utilization of range resources. This can be done after completion of 5 years of range monitoring studies, in accordance with the provisions of the court orders arising from the NRDC lawsuit. The initial adjustment must be made within 5 years of completion of the ROD for this RMP/EIS.

Future demand for livestock forage could be met with more intensive grazing systems and land treatments. Development and implementation of AMPs on allotments with the potential to respond to intensive management would produce more forage to help meet demand. Vegetative manipulations, such as chainings, herbicidal applications, and prescribed fire, are possible on many areas to increase forage production.

TABLE 4322-16

Allotments with Season of Use Problems

Allotment	Season of Use
Church Rock	12/1 to 5/31
Indian Rock	11/15 to 5/15
Owens Dugout	11/25 to 5/20
Peters Canyon	11/16 to 5/15
Big Indian	12/5 to 5/25
Dry Valley-Deer Neck	12/1 to 5/10
East Canyon	12/1 to 4/30
Hart Draw	10/16 to 6/15
Hart Point	12/5 to 5/31
Hurrah Pass	11/25 to 4/15
Lone Cedar	12/1 to 4/30
Mail Station	11/1 to 5/15
Monticello Cowboy	11/16 to 4/30
Tank Draw	12/1 to 4/30
Black Steer	12/1 to 4/30
Bug Squaw	1/1 to 5/20
Perkins Brothers	11/1 to 5/31
Cave Canyon	11/1 to 5/15
Alkali Canyon	11/1 to 5/31
Montezuma Canyon	11/1 to 5/31
Slickhorn	10/16 to 6/15
Texas-Muley	11/15 to 5/31
Cross Canyon	11/1 to 5/15

NOTE: Grazing occurs in all or part of the allotment every year during the spring growing season, and the allotment is not under an AMP.

Development of stock watering areas and improved access for livestock to inaccessible areas are also possible on some allotments.

Season of use changes to incorporate rest and allow recovery of plant vigor could be implemented with grazing systems on some allotments. In many cases, fencing and water developments would be required to implement the system.

Within the resource area, most of the seedings are losing their value for grazing because they are reverting to nonforage vegetation. They need to be treated within the next 5 to 10 years to control reinvasion of trees and shrubs, if their usefulness for livestock grazing is to be maintained.

These types of management opportunities can be achieved through AMPs expected to be prepared as an end product of the RMP process. The RMP can identify allotments where AMPs could be developed, and the RPS prepared as part of the RMP/EIS process can serve to summarize problem areas within specific allotments. The RMP can also serve to identify areas where grazing use or range improvements should not be allowed, to protect other surface resources and uses.

Some allotment boundaries may need to be adjusted. This can be done administratively and is not part of the RMP process.

ACEC POTENTIAL

Several areas within the SJRA could probably qualify for ACEC designation to recognize and protect rangeland resources. These potential sites are the mesa tops that are isolated, or relatively so, from man's activities. These areas could serve as relict or comparison areas for similar ecosystems in the resource area or outside it. The two best known possibilities that have been studied to some degree in relation to such a designation are Lavender Mesa and Bridger Jack Mesa. Other isolated mesas may have similar ACEC potential, but not enough is known about them to make a recommendation for ACEC designation.

Other ecologically unique areas in the SJRA include hanging gardens along seeps in canyon walls. These are small, localized areas that have not been mapped and are not believed to meet ACEC criteria of relevance and importance. Accordingly, none have been recommended as ACECs.

The following tow areas have been found to have potential for ACEC designation: Lavender Mesa and Bridger Jack Mesa.

Lavender Mesa

Lavender Mesa (640 acres in T. 31 S., R. 21 E., shown in figure 4322-2) is isolated, inaccessible to man and herbivores by ground routes. Even small mammals such as rabbits and mice appear to be absent. Most of the mesa is a pinyon-juniper woodland with a small (20-acre) sagebrush-grass park.

The vegetative community is unique because it has developed without the influence of grazing animals and most other mammals. It therefore has value

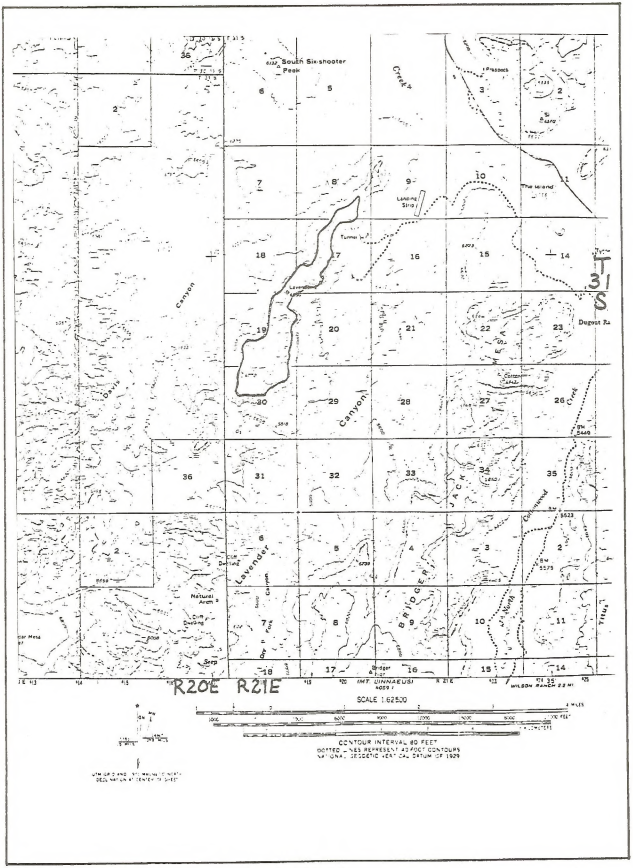

South Six-shooter Peak
Creek
Prospect
The Island
Landing Strip
Tunnel
Lavender Peak
Canyon
Davis
Dugout Ra
T 31 S
Cotton
MESA
JACK
Canyon
Creek
Cottonwood
North
BM 5449
BM 5575
5523
Cliff Dwelling
Lavender
Canyon
Natural Arch
Cliff Dwelling
Seep
Dry Fork
BRIDGER
Bridger
Titus
R20E R21E
(MT. LINNAEUS)
WILSON RANCH 2.2 MI
SCALE 1:62500
CONTOUR INTERVAL 80 FEET
DOTTED LINES REPRESENT 40-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FIGURE 4322-2

Potential Lavender Mesa ACEC

for scientific study and as a comparison area for similar vegetative communities that have been grazed. Data on the vegetation are available in Van Pelt's (1978) thesis.

The area appears to meet the ACEC criteria of relevance and importance (see 43 CFR 1610.7-2). The mesa top is ecologically relevant because it presents an isolated, relict plant community that remains unaltered by human intervention. The vegetative community is important for study and comparison purposes to design management for pinyon-juniper woodland and sagebrush-grass communities in other parts of the Colorado Plateau. It is therefore more than locally significant, particularly if no similar isolated areas are being protected from man's activities and set aside for study and comparison.

No land use presently threatens the special value. There is a potential for the value to be threatened if surface disturbing activities such as grazing, wildlife introductions, or mining were proposed and allowed. Such disturbances could destroy the relatively undisturbed vegetation community's value for scientific study and comparison.

The entire mesa is BLM administered public land.

The adjacent public lands are open to all multiple uses. These uses do not threaten the special value of the area because the cliffs surrounding the mesa top do not allow encroachment of adjacent activities.

The following are possible management prescriptions which would serve to protect the natural and scientific values of the mesa top.

1. Allow no surface disturbing use of the mesa top such as mining, oil and gas exploration and development, or grazing.

2. Allow scientific study of the area.

3. Disallow any wildlife introductions if any are ever proposed.

The mesa top could also qualify as an RNA and be set aside under 43 CFR 8223 for scientific study. These regulations prohibit any use of an RNA that is inconsistent with the purpose for designation.

Another type of designation that could be applied to this area is a Natural Resources Experiment and Research Area (see 43 CFR 2071.1). This designation applies to relatively small areas of land used for research and experiment purposes. The mesa top could qualify under this designation to provide a baseline for rangeland research.

Some interest has been expressed in attaching a special designation to the area. Van Pelt (1978) recognized the value of the mesa for scientific study and comparison purposes. A March 4, 1985 letter, from J. Bernard recommended that the RMP maximize protection of sensitive ecological areas and areas of environmental interest. Utah State University, Department of Range Science, in a letter written March 25, 1985, recommended that the RMP consider ACECs and special ecological areas.

Bridger Jack Mesa

Bridger Jack Mesa is a rather large mesa (5,200 acres in T. 31 and 32 S., R. 21 E., shown in figure 4322-3) consisting of pinyon-juniper woodland and sagebrush-grass parks. It is relatively isolated, being accessible only by foot or horseback travel. It was grazed by saddle horses from the 1920s until about 1957 when this use ended. Other than trespass grazing by horses in the winter of 1972-73, it has not been grazed since 1957. It supports a population of wintering mule deer, as well as year-round populations of smaller animals.

Bridger Jack Mesa is a natural exclosure for study of a vegetative community released from grazing by domestic livestock. Data on the soils and vegetation of the area are available in Van Pelt's (1978) thesis.

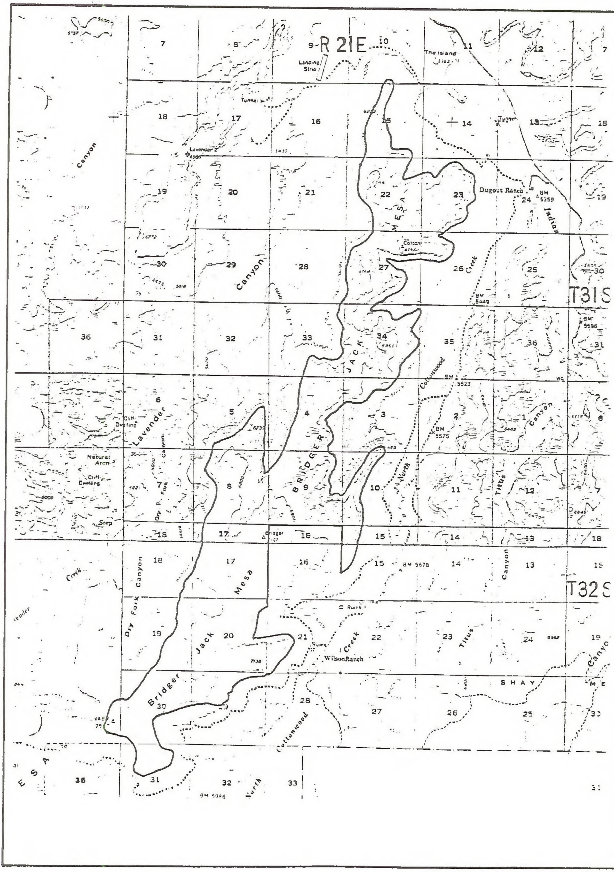
The area appears to meet the ACEC criteria of relevance and importance (see 43 CFR 1610.7-2). The mesa top is ecologically relevant because it presents an isolated, relict plant community that remains unaltered by human intervention. The vegetative community is important for study and comparison purposes to design managment for pinyon-juniper woodland and sagebrush-grass communities in other parts of the Colorado Plateau. These communities are important for livestock and wildlife throughout the Colorado Plateau. It is therefore more than locally significant, particularly if no similar areas are being protected from man's activities and set aside for study and comparison.

No land use presently threatenes the special value of the area. There is a potential for this value to be threatened if surface disturbing activities such as grazing, mining, or oil and gas activities were proposed and allowed. Such disturbances could destroy the relatively undisturbed vegetation community's value for scientific study and comparison.

The entire mesa is public land except for approximately 420 acres of state land in Section 16 of T. 32 S., R. 21 E. Approximately 60 acres are under mining claims on which assessment work is current (as of July 1983) with BLM (BLM, 1982c). Approximately half of the mesa top is covered under oil and gas leases. Since the mesa is in a no surface occupancy lease category, no surface disturbance is likely to occur.

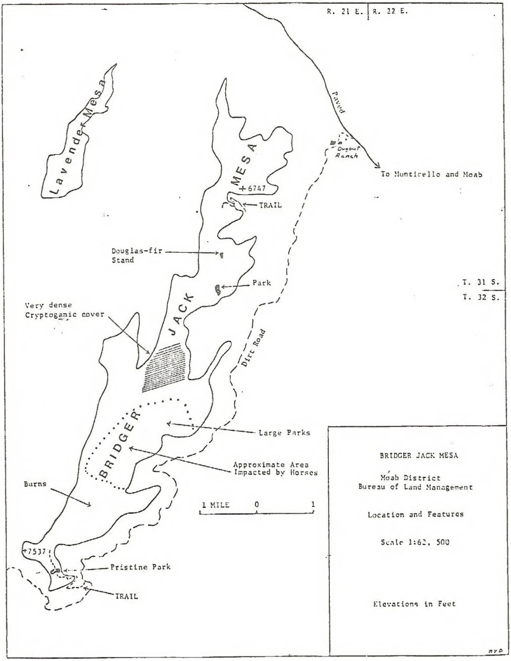
The adjacent public lands are open to all multiple uses. These uses do not threaten the special value of the area, because the cliffs surrounding the mesa top do not allow encroachment of adjacent activities.

Rather than protect the entire mesa from surface disturbance, a portion of the mesa could be set aside to be protected. The protected portion could be that part of the mesa south of the south section line of Section 8, T. 32 S., R. 21 E. (see figures 4322-3 and 4322-4). This would leave a fairly large area available for study, large enough not to be influenced by micro-climate changes associated with smaller fenced exclosures. This area would include a variety of vegetative types and past events, including burned areas, pristine parks and woodlands, grazed areas, and areas of dense cryptogamic cover.



R 21E
T31S
T32S
Landing Strip
The Island
Tunnel
Lavender 2
Dugout Ranch
Indian
Creek
Canyon
Cottonwood
Jack
Mesa
Bridger
Lavender
Cliff Dwelling
Natural Arch
Dry Fork Canyon
North
Titus
Seep
Ruins
Wilson Ranch
Shay
Mesa

FIGURE 4322-3
Potential Bridger Jack Mesa ACEC


R. 21 E.
R. 22 E.
Lavender Mesa
Paved
Dugout Ranch
To Monticello and Moab
MESA
+6747
TRAIL
Douglas-fir Stand
Park
T. 31 S.
T. 32 S.
JACK
Very dense Cryptogamic cover
Dirt Road
BRIDGER
Large Parks
Approximate Area Impacted by Horses
Burns
1 MILE
0
1
+7537
Pristine Park
TRAIL
BRIDGER JACK MESA
Moab District
Bureau of Land Management
Location and Features
Scale 1:62,500
Elevations in Feet
RYD

Source: VanPelt, 1978

FIGURE 4322-4

Potential ACECs - Lavender and Bridger Jack Mesas

The following are possible management precriptions which would serve to protect the natural and scientific values of the mesa top.

1. Allow only limited surface disturbing use of the area such as scientific study, hiking, and recreational hunting.

2. Disallow surface disturbing use such as grazing, mining, and oil and gas exploration and development.

The mesa top, or a portion of it, could also qualify as an RNA or ONA. An RNA is set aside under 43 CFR 9223 for scientific study. These regulations prohibit any use of an RNA which is inconsistent with the purpose for designation. An ONA is set aside under 43 CFR 8352 to manage for maximum recreation on lands with unusual natural characteristics. The regulations inidcate that an ONA should be large enough to protect natural values while managing for recreational uses. Scientific interest is not a criterion for ONA designation.

Another type of designation that could be applied to this area is Natural Resources Experiment and Research Area (see 43 CFR 2071.1). This designation applies to relatively small areas of land used for research and experimental purposes. The mesa top could qualify under this designation to provide a baseline for rangeland research.

Some interest has been expressed in attaching a special designation to the area. Van Pelt (1978) recognized the value of the mesa for scientific study and comparison. In a letter dated September 19, 1983, The Nature Conservancy recommended Bridger Jack Mesa for designation as an ONA or RNA. A March 4, 1985 letter from J. Bernard recommended that the RMP maximize protection of sensitive ecological areas and areas of environmental interest. Utah State University, Department of Range Science, in a letter written March 25, 1985, recommended that the RMP consider ACECs and special ecological areas.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Grazing management has been affected by oil and gas management, cultural resources, wildlife habitat conflicts, and IMP.

One conflict with livestock grazing is the increasing activity of oil and gas exploration and development. Major conflicts of this type are occurring in the McCracken Wash, Cross Canyon, Alkali Canyon, and White Mesa Allotments. Oil and gas activities are taking land out of production for livestock forage with the construction of roads, well pads, and seismograph trails.

In the past 5 years (FY 79 through FY 84), approximately 11,000 acres of BLM rangeland have been affected in an area of about 300,000 acres (an area bounded by U-666, U.S. 191, the Navajo reservation and the Utah state line). Of this total disturbance, approximately 10 percent has resulted from oil and gas drilling and 90 percent from seismic operations. Most of the forage loss or disturbance is short-term, resulting from seismic operations.

Rehabilitation efforts generally re-establish grazable livestock forage in 2 to 10 years. Long-term forage loss over this same period has occurred on approximately 500 acres. This loss has resulted from oil and gas production facilities, which can be expected to remain for the life of the production field (estimated to be 50 years). If this trend continues, it can be expected that another 8,000 or so acres will be affected through 1990.

Curtailment of oil and gas exploration and development to prevent negative impacts to grazing through forage loss is not discretionary. Curtailment would be contrary to BLM's policy to encourage oil and gas development. Therefore, continuation of the present mitigating procedures is all that can be done. This mainly includes reseeding and reclaiming of disturbed areas by the energy companies to regain lost forage.

Management of cultural resources constrains livestock management in that proposed range improvements must avoid cultural resources. This is generally possible by shifting the proposed location of the project if a cultural resource inventory or clearance reveals a conflict.

Cattle and desert bighorn sheep do not compete for forage, space, or water at present, because they generally do not occupy the same areas at the same time. However, there is the potential for conflict to occur if livestock water developments, trails, or vegetation treatments lead to occupation of the same areas at the same time.

This potential conflict has prevented construction of some range improvements, such as proposed reservoirs on the benches of Gravel Canyon in the White Canyon Allotment. It was thought that more cattle use with the increased water would cause direct conflicts between cattle and bighorn sheep in this area.

IMP could constrain future range improvements and intensive management systems. Approximately 387,020 acres (or 20 percent) of the resource area's alloted BLM acreage is under IMP management. This affects parts of 10 allotments. Since much of this IMP acreage is rugged or inaccessible, IMP management has little impact on grazing management in these areas. However, in those areas where intensive management and range improvements are possible, IMP may not allow certain range improvements, such as chainings and stock trails, that would permanently impair the area's suitablility for wilderness designation.

A stock trail was proposed in the Squaw-Papoose Canyon WSA in the Bug-Squaw Allotment. Since bulldozer construction of this trail was thought to be impairing to wilderness values, it was not allowed.

Maintenance of seedings may also be a problem if maintenance is restricted to the same method as the original treatment, as stated in IMP guidelines. This would preclude maintenance by prescribed fire and herbicides. IMP could affect 6 allotments totaling 1,123,000 acres, including 2,300 acres of existing seedings and 9,000 acres of proposed seedings.

DOCUMENTED PUBLIC CONTROVERSY

Range improvements were a major item of concern at public meetings held in April 1983 to identify issues for the San Juan RMP. Many comments favored additional range improvements (including land treatments such as chainings and seedings) on BLM lands to improve and increase livestock use and to improve range condition. This concern was also voiced by local government officials (county commissioners and city mayors) in a March 1983 scoping meeting. Documentation is in the resource area central planning files.

Proposed range improvements in GCNRA are documented by eight letters from TY Cattle Company, the grazing permittee, BLM, NPS, and UDWR during the period between February 18, 1981 and August 22, 1984. These are filed in the TY Cattle Company grazing case file in BLM's SJRA office in Monticello. These proposals have not been allowed, due to conflicts with GCNRA management policy for natural zones.

Controversy was also documented during the wilderness review program. Grazing permittees were generally negative to WSA designation and potential future wilderness designations because of restrictions on the manner and degree of livestock grazing and on range improvements.

4331 NATURAL HISTORY/CULTURAL RESOURCES MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

No MSA overlays will be made. Only archaeologists and other individuals with a demonstrated interest in the study and protection of archaeological resources are allowed access to confidential cultural resource information. The SJRA site and inventory map files provide location information to individuals qualifying under the Archaeological Resources Protection Act.

RESOURCE OVERVIEW

This management program as administered by the BLM covers natural history resources; paleontological resources; and cultural resources, both historic and prehistoric.

Natural history resources are ecologic or geologic features significant to the nation's natural heritage.

Paleontological resources are fossils of plants and animals that lived in former geologic periods. They can be found in almost all geologic formations exposed at the surface in the SJRA. The most significant fossils are located in the Morrison Formation (vertebrate) and the Chinle Formation (invertebrate) (cross-reference: Geology, Part I). However, no fossil sites have been formally identified in the SJRA, because no inventory has been conducted.

Cultural resources are those fragile and nonrenewable remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were important in human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred, even though evidence of the event no longer remains, and (3) the environment immediately surrounding the actual resource. Cultural resources, including both prehistoric and historic remains, represent a part of the continuum of events from the earliest evidences of man to the near present. BLM, in Utah, defines a site as a discrete locus of human activity presumed to be interpretable (Fike, 1984).

Archaeologically, SJRA is one of the richest locales under BLM management. The resource area contains the entire range of cultural resources (see table 4331-1). Historic resources include the Hole-In-the-Rock (Mormon) Trail, Navajo hogans and sweat houses, and Ute pine nut gathering camps. Prehistoric resources include isolated Paleo-Indian stone projectile points, Archaic camps, Basketmaker burial caves, Pueblo rubble mounds, and Hopi pot drops.

TABLE 4331-1

National Historic Landmarks; National Register and Potentially Eligible Cultural Properties and Archaeological Districts; and Potential Indian Tribal, Religious, and Cultural Sites and Areas

Category and Name of Site or Area	Year of Designation	Acreage
National Historic Landmarks		
Alkali Ridge	1985	2,340
National Register Cultural Properties		
Big Westwater Ruin	1974	less than 1
Sand Island Petroglyph	1980	less than 1
Hole-in-the-Rock Trail	1980	[a]40,300
National Register Archaelogical Districts		
Butler Wash	1981	2,025
Grand Gulch	1982	4,240
Potentially National Register Eligible Cultural Properties		
Davis Canyon Archaeoastronomy Sites		less than 1
Kachina Panel		less than 1
Monarch Cave		less than 1
Moon House Ruin		less than 1
River House Ruin		less than 1
Ruin Springs		10
Shay Canyon Petroglyph		less than 1
Three Kiva Pueblo		less than 1
Three Story Ruin		less than 1
Potentially National Register Eligible Archaelogical Districts		
Beef Basin		35,000
Cedar Mesa		350,000
Fable Valley		5,000
Indian Creek Canyon		1,000
Montezuma Creek		10,000
Tin Cup Mesa		2,500
Potential Indian Tribal, Religious, or Cultural Sites/Areas		
Bears Ears		1,000
Sacred Mountain		40

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[a] Within SJRA, corridor is 126 miles long and 0.5 mile wide.

Of the approximately 17,000 recorded sites in San Juan County, it is estimated that over 10,000 are situated on public lands. Only about 5 percent of public land in the SJRA has been intensively inventoried for cultural resources, leading archaeologists to estimate that the resource area may hold as many as 200,000 sites.

The condition of cultural resources in the SJRA varies from poor to excellent. Their preservation is aided by the dry climate of the Four Corners area. However, many sites have been disturbed or destroyed, intentionally or unintentionally, through human activity over the past 100 years. It is now difficult to find undisturbed cultural resources.

The overall trend in the condition of cultural resources in the SJRA is downward, because of impacts primarily from energy exploration and development, recreation use, and pot hunting. In the few areas where those activities do not occur, the overall trend is stable.

MANDATES AND AUTHORITIES FOR USE AND PROTECTION

National Laws

FLPMA directs the BLM to manage paleontological and cultural resources on the public lands in a manner that will protect them and provide for their proper use. FLPMA also provides for the designation, where appropriate, of ACECs to ensure specialized management of these resources.

The Antiquities Act of 1906 provides for the protection of paleontological and cultural resources on all federal lands. It also dictates penalties for those who excavate or appropriate these resources without a permit.

The Historic Sites Act of 1935 provides for identification and preservation of historic sites, buildings, objects, and antiquities of national significance.

The Reservoir Salvage Act of 1960, as amended in 1974, provides for recovery and preservation of historical and archaeological data that may be destroyed as a result of federally funded or federally licensed dams, reservoirs, attendant facilities, and activities.

The National Historic Preservation Act of 1966 outlines a national policy for historic preservation; expands the National Register of Historic Places to include cultural resources of local, state, and regional, as well as national significance; establishes the Advisory Council on Historic Preservation; and directs all federal agencies to consider the effects of their actions on cultural properties included in, or eligible for inclusion in, the National Register of Historic places.

The Department of Transportation Act of 1966 directs the Department of Transportation to spend funds on evaluation, avoidance, and protection of cultural resources affected by federally supported road construction.

The Archaeological and Historic Preservation Act of 1974 requires the recovery, preservation, and protection of historic and archaeological data which might otherwise be lost as the result of federally licensed or assisted activities or programs (up to 1 percent of project cost).

The American Indian Religious Freedom Act of 1978 protects the rights of American Indians to believe, express, and exercise their traditional religions.

The Archaeological Resources Protection Act of 1979 defines and protects archaeological resources on public and Indian lands.

Executive Orders

EO 11593, Protection and Enhancement of the Cultural Environment (1971), directs all federal agencies to (1) inventory their cultural resources; (2) nominate to the National Register all qualified cultural properties meeting the critieria and protect them; and (3) use due caution with all cultural resources until the inventory, evaluation, and nomination processes are completed.

Regulations

Natural history, paleontological, and cultural resources are included in the resources that can be protected under 43 CFR 1610.7-2, which gives specific criteria for ACEC designations.

Natural history resources are generally managed as National Natural Landmarks under authority of the Historic Sites Act of 1935 and in accordance with 36 CFR 62. BLM management of natural history resources is also subject to 43 CFR 8200, which provides for identification and establishment of RNAs, and 43 CFR 8352, which provides for designation of ONAs.

Paleontological resource management is regulated in part by 43 CFR 3600, which governs the disposal of mineral materials, including petrified wood. Specifically, 43 CFR 3622 provides for free use of petrified wood without a permit, up to a limit of 250 pounds per person per year within free use areas.

Cultural resource management is regulated by several CFR sections.

36 CFR 60	authorizes and expands the National Register of Historic Places.
36 CFR 63	explains how to request and obtain determinations of eligibility for cultural properties that would be affected by proposed actions.
36 CFR 800	establishes procedures for federal compliance with the requirements of Section 106 of the National Historic Preservation Act and EO 11593.
40 CFR 1500	directs federal agencies to comply with NEPA and with consultation requirements of the National Historic Preservation Act of 1966.

43 CFR 3	codifies the Uniform Rules and Regulations issued to implement the Antiquites Act of 1906.
43 CFR 7	establishes uniform procedures for implementing the Archaeological Resource Protection Act of 1979. These regulations enable federal land managers to protect archaeological resources on public and Indian lands by issuing permits for authorized excavation or removal of archaelogical resources; by imposing civil penalties for unauthorized excavation, removal, damage, alteration, or defacement of archaelogical resources; by providing for the preservation of archaeological resource collections and data; and by ensuring confidentiality of information about archaeological resources when disclosure would threaten the resources.

Instruction Memorandums

77-355	National Register Interim Guidelines for Multiple Resource Nominations and Thematic Group Nominations.
78-361	Cultural Resource Management Plan Guidelines.
78-389	Guidelines for the Physical Protection of Cultural Resources.
81-29	Cultural Inventory on Nonfederal Rights-of-Way.
82-454	Review of Draft Procedures for Issuance of Cultural Resource Use.
83-746	Interim Policy on Cultural Resource Inventory.
84-81	Sets policy for maintenance and operation of the cultural program, the major components of which include clearances, legislative compliance, files management, special properties, critically needed preservation and protection, and public inquires. (This is also the policy of the Washington Office.)
84-576	Transfers paleontological program responsibility and direction from the Division of Geology and Mineral Resources to the Division of Recreation, Cultural, and Wilderness.
85-68	Explains the objectives of paleontological resource management, which are to - identify and evaluate paleontological resources so that those resources may be adequately addressed in the BLM's planning system and environmental analysis documents; - develop management plans to protect those paleontological resources considered to be of significant scientific interest; - provide for scientific collection and research, recreational collecting, and educational or interpretive activities;

- increase the awareness of paleontological resource management requirements and to encourage public participation in their management; and
- promote consistency among federal agencies and facilitate the exchange of information among federal, state, and local governments and private organizations concerned with the management, study, and protection of these resources.

UT-84-197	Interim Policy, Federal Antiquities Permits.
UT-84-336	American Indian Religious Freedom Act Tribal Consultation.

Bureau Manuals

The BLM 8100 manual series requires preservation and protection of samples of the full array of cultural resources; full consideration of cultural resources in all land use planning and management decisions; management to maintain and enhance scientific and socio-cultural values; and avoidance of inadvertent damage to cultural resources. Subsections include 8120, nominations; 8130, planning; 8146, administrative and physical protection measures, avoidance, and mitigation processes; and 8150, procedures of the federal antiquities program.

RESOURCE ALLOCATIONS

Natural history resources may be recognized as National Natural Landmarks, ACECs, RNAs, ONAs, or other specific designations. There is currently (1984) a move in the BLM to consolidate all special designations under ACEC (see Special Area Policy paper and Managing Special Areas on the Public Lands, covered by a memorandum from the Deputy Director for Lands and Renewable Resources, dated November 9, 1984).

Paleontological resources other than petrified wood are not allocated, but significant sites, if found, can be recognized through designation of a National Natural Landmark or an ACEC. Petrified wood is addressed in 43 CFR 3622; in free use areas, up to 250 pounds of petrified wood per person per year can be collected for personal use without a permit. Commercial use, collection of more than the specified limit, or collection within a designated fee area, would require purchase of a permit.

Use allocations of cultural resources can be achieved through a variety of means, including nomination to the National Register of Historic Places or the National Landmark System; special designations such as ACECs and conservation areas; and identification of American Indian tribal, religious, or cultural sites.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

The SJRA currently does not manage for recognized natural history resources.

Paleontological resources in the SJRA are not now actively managed. IMP does not address paleontological resource management, and current planning is also silent on the subject. Because no mineral materials designations have been made, the entire resource area is considered a free use area for the purposes of 43 CFR 3622 regarding collection of petrified wood. This allows individuals to collect up to 250 pounds per person per year (or 25 pounds per day), without a permit, for noncommercial use (cross-reference: Mineral Material, Part II).

BLM currently (January 1985) evaluates cultural resources according to seven use categories:

- Current scientific use means that a cultural property is the subject of an ongoing scientific or historical study or project, under permit, at the time of evaluation; upon completion of that study or project, the cultural property shall be assigned to one of the other use categories.

- Potential scientific use means that a cultural property is presently eligible for consideration as the subject of scientific or historical study utilizing currently available research techniques, including study which would result in its physical alteration, and it need not be conserved in the face of an appropriate research or data recovery (mitigation) proposal.

- Conservation for future use means that because of scarcity of similar cultural properties, a research potential that surpasses the current state of the art, singular historic importance or architectural interest, or comparable reasons, a cultural property is not presently eligible for consideration as the subject of scientific or historical study which would result in its physical alteration; that it is worthy of segregation from other land or resource uses which would threaten the maintenance of its present condition; and that it will remain in this use category until specified provisions are met in the future.

- Management use means that a cultural property is eligible for controlled experimental study that would result in its physical alteration, to be conducted by the BLM or other entities concerned with the management of cultural properties, for purposes of obtaining specific information leading to a better understanding of kinds and rates of natural or human-caused deterioration, effectiveness of protection measures, and similar lines of inquiry which would ultimately aid in the management of cultural properties.

- Socio-cultural use means that a cultural resource is perceived by a specified social and/or cultural group as having attributes that contribute to maintaining the heritage or existence of that group, and is to be managed in a way that takes those attributes into account, as applicable.

- Public use means that a cultural property is eligible for consideration as an interpretive exhibit-in-place, a subject of supervised participation in scientific or historical study, a subject of unsupervised collecting under permit, or related educational and recreational uses by members of the general public.

- Discharged use means that a cultural property, previously qualified for assignment to any of the other six categories, no longer possesses the qualifying characteristics for that use or for assignment to an alternative use, that records pertaining to it represent its only remaining importance, and that its location no longer presents a management constraint for competing land uses.

Current management of cultural resources in the SJRA emphasizes protection from direct and indirect impacts of surface disturbing activities. For the past 3 years (since 1982), the most common of these activities have been oil and gas exploration and development, pot hunting, and recreation use.

To protect them from development activities, sites are typically flagged so they can be avoided. Sometimes fences are erected around sites and then removed after project completion. Sites can be padded with earthen fill, but this practice is not easily reversed and is used with extreme caution.

Sites are stabilized if (1) they are highly visible and heavily visited; (2) money has already been invested in them; and (3) they are in imminent danger of destruction. Stabilization work is usually contracted out. If no archaeological excavation is necessary, a construction type contract is issued.

Sites are usually avoided instead of being tested or excavated. In many cases, a site is avoided by only a few inches or feet and eventually suffers indirect impacts. In these cases, prior testing could be both cost-effective to the developer and beneficial to cultural resources. When project redesign to avoid a cultural site appears impossible, the site can be tested to evaluate it for National Register eligibility. If the site is found to be eligible, it is either avoided or more completely excavated. Sites are also tested prior to stabilization or to assess impacts caused by development activities.

Most excavation is done by academic institutions pursuing research. An Archaeological Resources Protection Act permit is required and must include evidence of the applicant's qualifications, purpose of the proposed work, and the methods to be used. Because funding for academic research is extremely limited, little excavation work is now being done. However, the opportunities for archaeological research in the SJRA are unlimited.

The Area Manager's responsibility for cultural resource management includes making recommendations concerning (1) the eligibility of cultural resources for listing in the National Register; (2) the effect an undertaking may have on eligible cultural resources; and (3) the issuance or denial of cultural permits. Protective designations or stipulations can be developed through the RMP/EIS.

Sites known to have received impacts from surface disturbance or pot hunting activities are systematically monitored, as are specific sites along the San Juan River and in the Grand Gulch Plateau SRMA. Monitoring is documented in photographs, site sketch maps, and staff reports.

Within the SJRA, over at least the past 3 years (since 1982) the primary surface disturbing actions have been oil and gas exploration and development, recreational use, and livestock grazing. Exploration and development for other types of minerals and lands disposal actions also carry the potential to interfere with preservation of cultural resources.

Oil and Gas Leasing (4111 and 4112)

Seismic activity in the SJRA averaged approximately 1,500 miles per year during 1982 and 1983 (cross-reference: Oil and Gas Leasing, Part II). The majority of this exploration work occurred in areas of high site density (over 50 cultural sites per square mile) east and south of Monticello and Blanding. Many new trails created for this work are either left open or inadequately closed. Increased access to and visibility of cultural resources has led to site disturbance and destruction.

A second problem is illegal surface collection. Even when told of the laws protecting cultural resources, many people continue to collect surface artifacts illegally. Considering the heavy exploration activity in the SJRA,, the cumulative impact of surface collection is significant. Archaeologists are often unable to date a site or tell what function it had because diagnostic artifacts have been removed. As with illegal surface collection, the problem of illegal excavation is aggravated by increased access and visibility.

Mineral Material (4131) and Mining Law Administreation (4132)

Use of SJRA public lands for other types of mineral development has been at a low level since 1982. However, if use levels increase, the same types of constraints as noted for oil and gas leasing would be likely to occur (cross-reference: Mineral Material and Mining Law Administration, Part II).

Energy and Nonenergy Realty (4211 and 4212)

Within the SJRA, nearly all lands involved in realty actions have cultural properties that may be eligible for inclusion in the National Register. Eligible sites must legally be treated (usually excavated) prior to disposal actions. However, the applicant generally does not have funds available to do this. Consequently, few of these kinds of actions are processed, and cultural resources are not affected; however, the potential remains for loss of cultural resources (cross-reference: Energy Realty, Nonenergy Realty, and Withdrawal Processing and Review, Part II).

Grazing Management (4322)

Approximately 57,000 acres of public land in the resource area were chained during the late 1950s through the early 1970s (cross-reference: Forest

Management and Grazing Management, Part II). The majority of this vegetative manipulation was done without a cultural resource inventory. Cultural properties were damaged or destroyed. Sites have also been damaged by livestock trampling, especially near water developments.

Recreation Management (4333)

Intense recreational use, especially in the Grand Gulch Plateau SRMA and along the San Juan River, results in site trampling and illegal surface collection and excavation (cross-reference: Recreation Management, Part II). Site trampling results in multiple trailing across middens and causes walls and roofs to collapse. With approximately 10,000 people visiting the Grand Gulch Plateau SRMA during 1984, the cumulative effect of even minor illegal surface collection is immediately apparent. Illegal excavation continues to be a serious problem, even in the Grand Gulch Plateau SRMA, where a ranger force conducts patrols. Although it appears that most illegal excavation occurrs outside of the Grand Gulch Plateau SRMA, pot hunting occurred at Turkey Pen Ruin (in Grand Gulch) and at previously undisturbed Ribbon Ruin (in Slickhorn Canyon) during 1984.

Planning Guidance

In the past, the top of Bridger Jack Mesa was proposed by BLM as an ONA, and it has been shown as such on some BLM published maps. The designation was never made, pending completion of the wilderness inventory (cross-reference: Wilderness Management, Part II). The mesa top was subsequently designated as a WSA in 1980 (Bridger Jack Mesa WSA, UT-060-167, 5,290 acres) and is now managed under IMP. The Indian Creek-Dry Valley MFP recommended both Bridger Jack and Lavender Mesas be designated as RNAs, or that Bridger Jack Mesa be designated as an ONA. However, BLM did not conduct an inventory to determine suitability for the designations.

Planning guidance provided by the four MFPs is directed toward recreational use of cultural resources. The plans are silent as to management of the resource itself, except that the Montezuma and South San Juan MFPs identify inventory, protection, and enhancement of the cultural environment as being high priority. Enhancement includes data recovery, stabilization, and interpretation.

The draft Grand Gulch Plateau Management Plan (cross-reference: Recreation Management, Part II) did address management of cultural resources. The Grand Gulch Plateau Interim Management Plan (BLM, 1981) addresses management of cultural resources for all seven recognized uses. This plan will be superseded by completion of the final management plan following the RMP.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County. For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

The economic importance of paleontological resources can be delineated by scientific, commercial, and private uses. The last recorded scientific use of the resources was in 1985, when 3 people worked in the SJRA for 2 days. There has been no recorded commercial or private use. Although there is undoubtedly some commercial and private use of the resources, such use does not result in any local economic activity. Overall the economic activity related to the paleontological resource is sporadic and insignificant. There are no local government expenditures or fiscal effects related to the paleontological resource.

The local importance of cultural resources can be delineated into four categories: (1) archaeological work (clearances, mitigation, and research); (2) illegal surface collection and excavation; (3) tourism; and (4) socio-cultural uses.

Clearances, mitigation, and research comprise the direct archaeological employment in the area. Generally, the proponent of a surface disturbing action must have an archaeological clearance to protect cultural sites. Typically, 100 to 150 clearances are conducted each year by 10 to 12 archaeological consultants, requiring an estimated 1,000 person days of labor. Local consultants account for 25 percent of the clearance work; the other 75 percent of the work is conducted by consultants based outside the county. However, some local purchases of goods and services can be attributed to these nonlocal consultants.

Including the direct, indirect, and induced effects from local companies and local sales from nonlocal companies, archaeological clearances account for $46,000 of local income and 3.3 jobs (see table 4331-2).

When cultural sites cannot be avoided, they must be mitigated, usually by excavation. Mitigation work of this type is sporadic. Over the past 2 years, an average of 20 person days per year have been required to mitigate cultural sites. About 30 percent of the excavation work is done by local companies. Including the direct, indirect, and induced effects from local companies and local sales from nonlocal companies, archaeological mitigation accounts for $5,000 of local income and 0.3 local jobs.

Archaeological research is also sporadic. Over the past 2 years, an average of 700 person days per year have been spent in the county doing research, little of which was conducted by local companies. Including the direct, indirect, and induced effects from local sales by nonlocal organizations, archaeological research has accounted for $19,000 of local income and 1.3 local jobs (table 4331-2).

Illegal surface collection and excavation of artifacts also accounts for some local economic activity, for which statistics are not commonly available. The

TABLE 4331-2

Total Local Income and Employment Generated by Cultural Resources in the SJRA (1982 dollars)

	Clearance	Mitigation	Research	Illegal Artifact Collecting[a]	Tourism	Socio-Cultural
Personal Income (dollars)[b]	$46,319	$4,928	$18,516	d	d	d
Employment (jobs)[c]	3.3	1.3	1.3	30-60	d	d
Percent of Total County Employment						d

[a] Includes estimates of people who rely on artifact collecting for the majority of their income and people who rely on artifact collecting for only a part of their income. The employment estimates do not account for indirect effects.

[b] Personal income includes wages, salaries, proprietors' income, dividends, interest, rents, transfer payments, and residential adjustments.

[c] Employment includes wage and salary employment and proprietors.

[d] Cannot be quantified.

Sources: USFS, 1982; BLM records.

only available information is from informed sources within BLM (personal communications with Bruce Louthan, Moab District Archaeologist; Chas Cartwright, SJRA Archaeologist; and Pete Steele, SJRA Park Technician; May 1985).

Based on information from these sources, local residents do approximately 95 percent of the commercial artifact collecting in the SJRA. Approximately 10 to 15 people collect artifacts as a major means of support, while 15 to 20 people collect artifacts as a part-time means of support. Another 5 to 10 people purchase artifacts for resale in other markets (see table 4331-2). Sales and income estimates are based on conjecture; therefore, indirect and induced effects cannot be quantified. However, based on the employment figure alone, commercial artifact collecting accounts for more local economic activity than do archaeological clearances, mitigation, and research. Locally high unemployment and the high market value of artifacts are thought to have increased the amount of commercial artifact collecting over the past 2 years.

Cultural resources are one of the area's major tourist attractions. Some of the local expenditures associated with recreational use can be attributed to cultural resources. The local importance of recreation is discussed in the chapter entitled Recreation Management. Although recreation accounts for a significant portion of the county's economic activity, the proportion that is due to cultural resources cannot be quantified.

Cultural resources are also used by American Indians in maintaining their heritage. Existing use is low and economically insignificant.

Some of the program costs related to managing cultural resources also contribute to local sales and therefore to income and employment. These program expenditures directly generate $55,289 of personal income and 3.5 jobs (see table 4331-3).

In addition to the local income and employment effects, cultural resource activities also affect both the revenues and costs of local taxing jurisdictions. Revenues generated from cultural resource activities bring an estimated $1,800 to local taxing jurisdictions (see table 4331-4). These revenue figures are thought to be conservative, because they do not account for all related revenue sources. Jurisdictional costs could be neither delineated nor quantified.

CONSISTENCY WITH NON-BUREAU PLANS

The USFS final EIS and Land Use Plan for the Monticello Planning Unit, Manti-LaSal National Forest was approved in 1976. A new plan is now being drafted and is due in 1985. There are no conflicts under present USFS management.

The NPS has five plans that are related to management of paleontological and cultural resources in the resource area. These are:

- the General Management Plan for CNP, approved in 1978;

TABLE 4331-3

Local Importance of the SJRA Cultural Resource Program Related Costs (FY 1984, 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Program (dollars)	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	$117,485	$43,124	2.7
Other Sectors[a]		12,165	0.8
Total		55,289	3.5

[a] Includes the direct, indirect, and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

Source: BLM records; USFS, 1982.

TABLE 4331-4

Cultural Resource Related Taxing District Revenues
(Calendar Year 1984 and Fiscal Year 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues due to Cultural Resources[b] in the SJRA
Taxes	$3,543,909	$582,906	$7,530,196	$11,657,011	$1,800
Licenses and Permits	2,853	10,714		13,567	
Intergovernment	2,595,259	924,897	6,847,000	10,367,156	
Charges for services	227,039	82,810	148,000	457,849	
Fines and forfeitures	131,661	56,626		188,287	
Miscellaneous	970,241	285,855	447,820	1,703,916	
Totals	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$1,800

NOTE: Only taxes directly associated with the activity were assessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue sources are expected to be minor, these effects were not quantified.

Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

[b] Does not account for recreation related revenues.

Sources: Yoakum, 1985; Smuin, Rich, and Marsing, 1984; Monticello, 1984; Utah Tax Commission, 1985; and Utah Foundation, 1985.

- the Cultural Resource Management Plan for CNP, now being drafted and due in 1985;

- the Master Plan for Natural Bridges NM, approved in the 1960s;

- the General Management Plan for GCNRA, approved in 1980; and

- the Statement of Management for Hovenweep NM, approved in 1984 (a new general management plan is being drafted and is due in 1985).

These plans place a stronger emphasis on protection of paleontological resources and on the preservation, protection, and use of cultural resources than does the BLM's current management. The designation of an area as a unit of the NPS implies natural history values are present, and these management plans serve to protect those values.

DATA GAPS

No special data collection was made for this MSA. Statements made in this chapter are based primarily on professional judgment after 3 years work experience in the SJRA.

The BLM has done no inventories to identify or locate natural history values present.

A general inventory of natural history resources in the Colorado Plateau, including that portion of the SJRA north of the San Juan River, was prepared by BYU in 1980 for the HCRS (later absorbed by the NPS) (Welsh, et al., 1980). No sites were identified in the SJRA, and no additional inventory has been done.

In a study for the Nature Conservancy, VanPelt (1978) identified two potential RNA sites within the SJRA: Lavender Mesa, a relict plant community, and Bridger Jack Mesa, a near-relict plant community. These are discussed in the Grazing Management chapter.

Very little paleontological research (survey or excavation) has been done in the SJRA, and what has been done is little reported. The State Paleontologist with the Utah Division of State History, with cooperation of the BLM USO, is compiling an annotated bibliography of paleontological resources, which may help to fill this data gap. However, an inventory of paleontological resources is still needed to establish the critical threshold for impact assessment.

Numerous cultural inventories are on file in the resource area office as a result of cultural clearances performed for specific land use actions, especially oil and gas exploration and development; however, these inventories are site-specific and do not cover the greater portion of the resource area.

An impact assessment inventory of the area from Grand Gulch east to the Colorado state line needs to be conducted. This effort should include limited data recovery and would take approximately 4 years. An intensive inventory of little-known areas such as Dark Canyon, Fable Valley, and North Abajo is needed and would take about 2 years.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

There is little current demand for paleontological resources, as defined by requests for scientific, commercial, and recreational collecting permits. Most of the existing demand involves scientific use, but funding for paleontological research is difficult to obtain. The demand also involves potential public use of paleontological resources for commercial and recreational collecting and educational programs. The resource area is fully capable of meeting the current demand. No work months were used in FY 1984 for natural history or paleontological resource management.

Present demand for cultural resources under each of the seven use categories is described in table 4331-2. Present demand estimates are based on permit applications and user group comments. Capacity statements are based on professional judgment and the size of the known data base as a reflection of the total resource. The resource area is fully capable of meeting the present demand. In FY 1984 36 work months were used to manage cultural resources for these uses, plus another 12 work months in other subactivities that required support from the cultural program.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

Future demand for paleontological resources will likely remain low but stable, continuing to revolve primarily around scientific use. Academic institutions expect paleontological resources to remain available for study, with public lands being the likely source. Any increase in funding for this kind of research would bring a slight increase in demand. The resource area is probably capable of meeting this future demand. However, at least 2 work months per year would be needed in FY 1985 and future years for paleontological inventories and compliance work.

The anticipated future demand for cultural resources is described by use category.

The demand for current scientific use is expected to increase, especially if academic institutions receive more funding for research. If funding problems are eliminated, there would be a shift in the present emphasis on use of existing data. The general trend toward conducting more small research projects instead of a few large ones appears to be increasing the demand. The resource area is fully capable of meeting this future demand.

The demand for potential scientific use is expected to remain stable or increase. Academic institutions require a steady supply of cultural resources available for study. If funding problems decrease, and as existing data are exhausted, demand for potential scientific use will likely increase. The resource area is fully capable of meeting this future demand.

TABLE 4331-5

Present Demand for Cultural Resource Uses

Use	Demand	Examples
Current Scientific	Low	BYU's Recapture Project USU's Cedar Mesa Project
Potential Scientific	Medium	Davis Canyon archaeoastronomy sites
Conservation for Future	High	Fable Valley
Management	Medium	Alkali Ridge project
Socio-Cultural	Medium	Hole-In-The-Rock Trail Navajo hogans
Public	High	Grand Gulch Plateau SRMA
Discharged	Medium	Dry Valley public sale

The demand for conservation for future use is expected to increase. The public has become increasingly aware of the value of cultural resources and expects that there will be an adequate supply for future use. For example, concern is repeatedly expressed for preserving Cedar Mesa as an archaeological conservation area. If oil and gas exploration and development, pot hunting and recreation activities continue at the present high levels, it is unlikely that the resource area will be able to meet the demand for conservation for future use.

The demand for management use is expected to increase. Studies of kinds and rates of natural and human-caused deterioration, and of the effectiveness of protection measures, will become increasingly important as use impacts become more evident. The resource area is fully capable of meeting this future demand.

The demand for socio-cultural use is expected to increase. The policy inherent in the American Indian Religious Freedom Act of 1974 and the Archaeological Resource Protection Act of 1979 has only recently come to public attention in the area. As American Indians become more aware of their rights under these laws, their use of cultural resources in maintaining their heritage may increase. The resource area is fully capable of meeting this future demand.

The demand for public use is expected to increase. Recreational use in the Grand Gulch Plateau SRMA shows a steady increase (cross-reference: Recreation Management, Part II). Other public uses, especially educational, are also likely to increase. The resource area is fully capable of meeting this future demand. However, recreation use itself adversely affects the integrity of cultural resources.

The demand for discharged use is expected to increase. As more information is gathered, the data in some sites may not be needed. The resource area may be able to meet this future demand.

At least 60 work months per year are needed in FY 86 and future years to manage cultural resources for these uses.

CRITICAL THRESHOLDS

A critical threshold for natural history resources would be reached if management actions resulted in loss of significant natural history sites, or widespread disturbance of a variety of natural history sites (cumulative impact). The threshold is difficult to determine without an inventory to identify significant natural history sites, or the range of values represented in the SJRA.

A critical threshold for paleontological resources would be reached when significant resources are lost through collection or as a result of conflicting surface resource use. This could involve either loss of scientifically significant fossils (see IM 85-68) or loss of a significant amount across the resource area as a whole. The latter threshold cannot be determined without an inventory of the type and extent of paleontological resources within the SJRA.

A critical threshold for cultural resources would be crossed if management actions resulted in untreated disturbance to, or loss of, a cultural property. Within certain zones of the SJRA, a critical threshold could be reached within 10 years (by 1995) because of impacts from use of other surface resources and intense pot hunting. These zones are identified in the section on management opportunities.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Although no formal inventory has been done, natural history values are generally considered in assessing impacts of specific proposals through the NEPA process. Significant sites have not been recognized, however, and could suffer loss if their natural history value was overlooked.

The Area Manager has authority to protect paleontological resources from surface disturbing activities; however, due to lack of data and trained personnel, paleontological resources cannot be adequately monitored and are being irretrievably lost through surface disturbing activities. Current management can only result in continued loss unless significant paleontological resources can be identified and protected.

Protection of cultural resources is inadequate to ensure their availability for all proper uses now and in the future, and the rates of disturbance and destruction appear to be accelerating. The ability of the SJRA to provide adequate protection is limited by insufficient staffing and funding.

Insufficient funding results in specific program management deficits, such as inadequate review of permit applications, reports, and site forms; too infrequent field checks of consultants' work; and work duplication because of inadequately maintained records.

Special properties such as Grand Gulch, Mule Canyon Ruins, Butler Wash Ruins, River House Ruin, Three Kiva Pueblo, and Big Westwater Ruin are being maintained and operated minimally but adequately. Critically needed preservation and protection, especially stabilization of sites within the Grand Gulch Archaeological District and monitoring and surveillance of sites outside the Grand Gulch Plateau SRMA, are not being adequately accomplished.

Access to files by archaeological consultants for conducting literature searches is adequately provided for; however, responses to other public inquiries, especially for education programs, are not always sufficient to meet the need for visitor education.

Because there is no regional research plan, there is no framework through which cultural properties can be evaluated and therefore no defined threshold of significance. Consequently, most sites are thought of as significant, and therefore are being treated, usually by avoidance. Treatment, by law, must concentrate only on demonstrably significant sites.

Enforcement of the Archaeological Resources Protection Act has not been effective because of funding limitations and the absence of enforcement authority; pot hunting has therefore become systematic and intense.

Indirect impacts to cultural resources, such as surface collection of artifacts or inadvertent damage caused by rehabilitation work, have a profound cumulative adverse effect.

MANAGEMENT OPPORTUNITIES

The opportunity exists to recognize sites having significant natural history values through special designations. These could be National Natural Landmarks, ACECs, RNAs, or ONAs. The RMP/EIS could serve as a basis for these designations. The BLM could conduct field inventories to verify the recommendations of others, identify significant sites, or identify the range and types of natural values present in SJRA.

With adequate staffing and funding, a paleontological resource inventory could be completed, and a large-scale sensitivity map developed, outside the planning process. Surface disturbing actions proposed in a high sensitivity area could then be field checked. A field reconnaissance inventory of the highly sensitive areas would locate unique paleontological resources, which could then be protected for scientific and educational use.

Where significant paleontological resources are identified, the potential exists for a protective designation such as an ACEC, National Natural Landmark, or other special management area to be developed through the planning process.

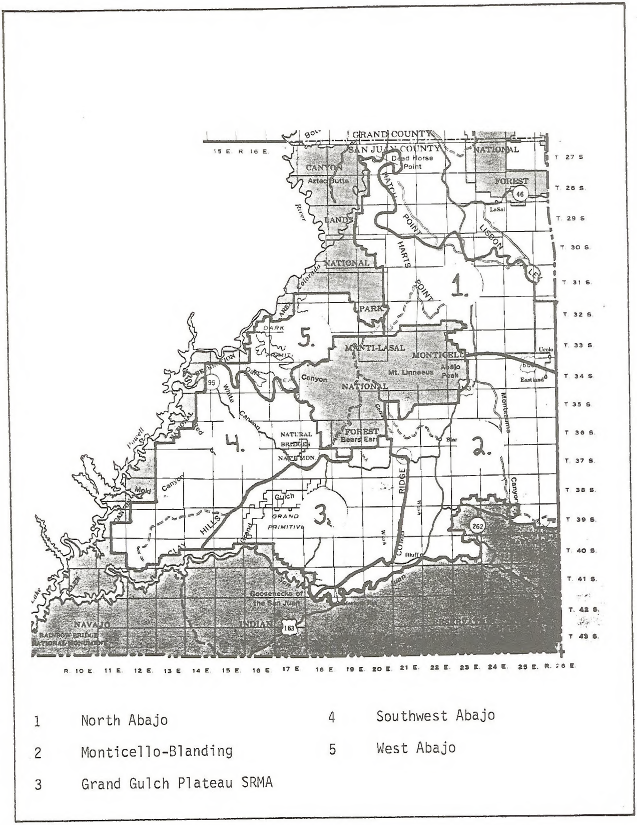
The opportunity also exists to determine whether any of the SJRA should be closed to free use of petrified wood.

Several types of opportunities have been identified to enhance management of cultural resources or to rectify weaknesses or inadequacies in current management.

Possible management of cultural resources could include division of the resource area into five cultural resource use allocation zones (see figure 4331-1) with specific management actions for each section (see table 4331-6). These zones could be established through the RMP/EIS on the basis of existing data and would help to resolve conflicts with other surface resource uses. Management prescriptions could then be developed for other surface uses based on the resolution of conflicts documented and analyzed in the RMP/EIS.

North Abajo Zone

Cultural resources in this zone need to be managed principally for potential scientific and public use. This zone contains Indian Creek and Bridger Jack Mesa WSAs. Cultural resources in the WSAs tend to be less disturbed, and particular management consideration is needed to ensure continued protection if the areas are not designated as wilderness.


GRAND COUNTY
SAN JUAN COUNTY
CANYON
LANDS
NATIONAL
PARK
Aztec Butte
Dead Horse Point
HATCH POINT
HARTS POINT
LISBON
NATIONAL
FOREST
LaSal
46
Colorado River
MANTI-LASAL
NATIONAL
FOREST
MONTICELLO
Mt. Linneaus
Abajo Peak
Ucolo
Eastland
Dark Canyon
PRIMITIVE
White Canyon
95
NATURAL BRIDGES
NATL MON
Bears Ears
Montezuma Canyon
Blanding
COMB RIDGE
Grand Gulch
GRAND PRIMITIVE
CLAY HILLS
Moki Canyon
Lake Powell
GLEN CANYON
Bluff
262
San Juan
Goosenecks of the San Juan
163
NAVAJO
INDIAN
RESERVATION
RAINBOW BRIDGE NATIONAL MONUMENT
1.
2.
3.
4.
5.
15 E. R. 16 E.
T. 27 S.
T. 28 S.
T. 29 S.
T. 30 S.
T. 31 S.
T. 32 S.
T. 33 S.
T. 34 S.
T. 35 S.
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T. 39 S.
T. 40 S.
T. 41 S.
T. 42 S.
T. 43 S.
R. 10 E. 11 E. 12 E. 13 E. 14 E. 15 E. 16 E. 17 E. 18 E. 19 E. 20 E. 21 E. 22 E. 23 E. 24 E. 25 E. R. 26 E.
1 North Abajo
2 Monticello-Blanding
3 Grand Gulch Plateau SRMA
4 Southwest Abajo
5 West Abajo

FIGURE 4331-1

Proposed Cultural Resource Use Allocation Zones

TABLE 4331-6

Proposed Cultural Resource Use Allocation Zones and Subzones

Area	Approximate Acres	Approximate % of SJRA	Anticipated Uses
North Abajo	275,000	16	Potential Scientific Use Public Use
Monticello-Blanding	500,000	28	Current Scientific Use Potential Scientific Use Management Use
Grand Gulch Plateau SRMA	400,000	22	
Grand Gulch Archaeological District	(5,000)	(less than 1)	Potential Scientific Use Management Use Public Use
Remainer of Grand Gulch Plateau SRMA	(395,000)	22	Conservation for Future Use Socio-Cultural Use Public Use
Southwest Abajo	440,000	25	Potential Scientific use
West Abajo	165,000	9	
Dark Canyon	(102,500)	(6)	Potential Scientific Use
Fable Valley	(2,500)	(less than 1)	Conservation for Future Use
Beef Basin	(60,000)	(3)	Potential Scientific use Public Use

NOTE: Acreages given include only BLM administered public lands.

Monticello-Blanding Zone

Cultural resources in this zone need to be managed principally for management use and current and potential scientific uses. The Alkali Ridge National Historic Landmark (acreages designated by the NPS) needs to be adequately protected.

Grand Gulch Plateau SRMA Zone

Cultural resources in the Grand Gulch Archaeological District subzone need to be managed principally for public use, management use, and potential scientific use.

Cultural resources in the Grand Gulch Plateau SRMA subzone (outside the Grand Gulch Archaeological District) need to be managed principally for public use, socio-cultural use, and conservation for future use. This subzone contains the Grand Gulch ISA Complex and the Mule Canyon, Fish Creek, and Road Canyon WSAs. Cultural resources in these WSAs are significant because of the wealth of undisturbed Basketmaker and Pueblo sites. Particular management consideration is needed to ensure continued protection if they are not designated wilderness.

Southwest Abajo Zone

Cultural resources in this zone need to be managed principally for potential scientific use. This zone contains the Mancos Mesa and Cheesebox WSAs. Gaining knowledge of cultural resources in these WSAs is important, because little is known about the prehistory of this area. Particular management consideration is needed to ensure continued protection if they are not designated wilderness.

West Abajo Zone

The West Abajo area is divided into three subzones.

Cultural resources in the Dark Canyon subzone need to be managed principally for potential scientific use. This subzone contains the Dark Canyon ISA and Middle Point WSA. Gaining knowledge of cultural resources in the ISA and WSA is important because little is known about the prehistory of this area. Particular management consideration is needed to ensure continued protection if they are not designated wilderness.

Cultural resources within the Fable Valley subzone (figure 4331-2) need to be managed principally for conservation for future use. Special management attention (possible nomination to the National Register as an archaeological district) is required to prevent irreparable damage to important cultural values in Fable Valley. Cultural resources in this area are nationally significant because of the wealth of undisturbed Pueblo habitation sites.

Cultural resources in the Beef Basin subzone need to be managed principally for potential scientific use and public use. The unique and accessible towers and other structures in Ruin Park are especially significant. This subzone

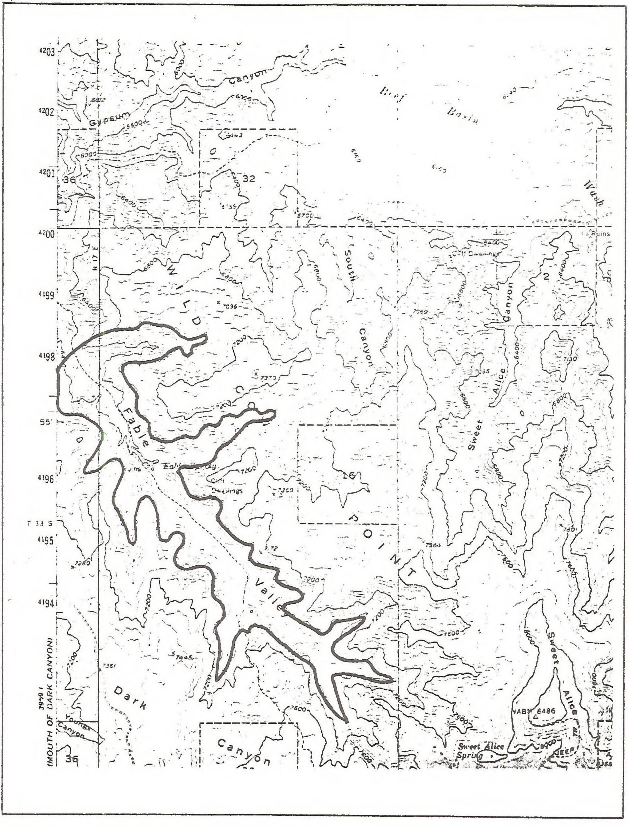

Gypsum Canyon
Beef Basin
Wash
WILD COW POINT
South Canyon
Sweet Alice Canyon
Fable Valley
Fable Spring
Ruins
Cliff Dwellings
Dark Canyon
Youngs Canyon
Sweet Alice Spring
JEEP TR.
R 17 E
T 33 S
(MOUTH OF DARK CANYON)
32
36
16
2
4203
4202
4201
4200
4199
4198
55'
4196
4195
4194
6000
5800
6400
6800
7200
7600
8000
7370
7269
7330
7035
7130
7801
7361
7445
7260
6486

FIGURE 4331-2

Fable Valley Subzone/Possible Archaeological District contains the Butler Wash WSA, for which particular management consideration is needed to ensure continued protection if the area is not designated wilderness.

Designation of ACECs (refer to the section on ACEC potential later in this chapter) or nominations to the National Register could accompany development of these cultural use zones. Potential sites can be identified and evaluated through the RMP. Such actions would serve to acknowledge that management for cultural resource use is sometimes the highest and best use of the public lands.

A significant ongoing management concern is consultation with American Indians. The American Indian Religious Freedom Act of 1978 protects Indians' right to believe, express, and exercise traditional religions. The Final Uniform Regulations (43 CFR 7) for the Archaeological Resource Protection Act of 1979 require that Indian tribes be notified if a proposed action on public or Indian lands may result in harm to or destruction of any tribal, religious, or cultural site. In order that the resource area satisfy the intent of these laws, it is necessary to consult with Ute, Navajo, and Pueblo peoples. Only through open communication can all parties arrive at mutually satisfactory ways to deal with this concern. Public participation efforts such as the San Juan RMP/EIS can provide the opportunity to open and maintain this sort of dialogue.

Other management opportunities identified could be accomplished administratively, although some would require action by higher level BLM offices and changes in current funding levels.

Inventories alone do not usually provide enough information to make a sound decision regarding eligibility and treatment of cultural properties. Testing is often needed to properly evaluate and develop appropriate mitigation for eligible sites. Where significant sites cannot be avoided, testing and excavation provide an opportunity to prevent irretrievable loss of vital information.

Another tool that could be used to evaluate cultural properties is a regional research design. The Utah Professional Archaeological Council is finalizing a draft of such a statewide document. The SJRA can assist in and benefit from this effort by sponsoring a yearly workshop to refine and update it. Archaeological consultants working in the SJRA can also be required to use the design when evaluating sites.

To meet current needs, cultural staffing needs to be increased by two positions (one archaeologist and one law enforcement position). This would permit implementation of the use allocation system described earlier and more effective management of conflicts with other surface uses.

The BLM Director may soon delegate federal law enforcement authority, though to what level is not known. Delegation to the resource area level would allow more effective control of pot hunting, both in and beyond the Grand Gulch Plateau SRMA.

Procurement funds could be allocated over the next 10 years (until 1995) for the following contracts:

- Four vandalism damage assessment contracts in areas receiving either heavy oil and gas exploration and development (Nancy Patterson , Monument, and Coalbed areas) or pot hunting (Comb, Butler, and South Cottonwood Washes, and the Recapture, Mustang, and Alkali areas). These contracts should include limited data recovery before significant information is lost.

- Two stabilization assessment and 18 stabilization contracts in areas receiving heavy recreation use (Grand Gulch Plateau SRMA).

- Four inventory contracts in poorly documented, significant cultural areas (Grand Gulch Archaeological District, Dark Canyon, Fable Valley, and North Abajo).

A management opportunity exists to compile orthophoto overlay site maps to avoid re-recordation.

The opportunity exists to better manage cultural resources present in the SJRA by increasing staffing and funding in other management programs where conflicts now occur, or by changing the emphasis in other programs to lessen impacts on cultural resources from oil and gas exploration and development, lands actions, livestock grazing, and recreation use.

Oil and Gas Leasing (4111 and 4112)

One additional compliance position is needed to deal with impacts on cultural and other resources caused by oil and gas exploration.

Energy and Nonenergy Realty (4211 and 4212)

Emphasis could be placed on nondisposal actions to retain cultural resources under federal ownership and control.

Grazing Management (4322)

Emphasis could be placed on low-impact projects, such as fencelines, and on maintenance of existing chainings instead of new vegetative manipulation projects.

Recreation Resources Management (4333)

Recreation staffing in SJRA could be increased by one position, to make visitor contacts in the field and perform campsite and trail rehabilitation, if stationed at Kane Gulch.

Habitat Management (4351)

The critical deer winter range in Beef Basin coincides with the West Abajo proposed use allocation zone. Emphasizing management to protect this critical wildlife habitat may inhibit some development, to the benefit of cultural resources.

ACEC POTENTIAL

Two areas have potential to qualify for RNA or ACEC designation based on natural history values: Lavender Mesa and Bridger Jack Mesa. These are discussed in detail in the Grazing Management chapter. No areas have been identified as having potential for ACEC or other special designation based on paleontological values; however, this reflects lack of inventory work rather than a probable lack of resource values.

Three areas in the SJRA have the potential to qualify for ACEC designation under the cultural resources management program. Specific sites in these areas have potential for designation as National Natural Landmarks, based on localized natural features, or to the National Register of Historic Places. Specific sites could be so designated, even with an ACEC designation in place.

North Abajo

The North Abajo zone contains approximately 75,000 acres (see figure 4331-3). Cultural resources in this transitional Anasazi/Fremont area are regionally and nationally significant because of the wealth of unique and sensitive rock art sites and rare archaeoastronomy sites.

Special management attention is required to prevent irreparable damage to important cultural values in this area. Irreparable damage to the cultural values found here can be prevented only by maintaining the area in its relatively primitive state. Answers to current research questions concerning relations between Anasazi and Fremont peoples can be found within the cultural resources present in this potential ACEC. These cultural resources, especially the rock art sites, are particularly vulnerable.

Increasing and unsupervised recreational use threatens cultural resources located in this area, especially in Indian Creek Canyon. Potential threats include expansion of Newspaper Rock State Park and testing and possible siting of a high level nuclear waste repository in either Davis or Lavender Canyon. These existing and potential uses threaten the special cultural values through increased access and consequent site visitation.

The majority of this potential ACEC is administered by the BLM, except for private lands in the lower Indian Creek and North Cottonwood Creek bottomlands and a few scattered state sections. Oil and gas leases and uranium mining claims are widely scattered across the area.

The potential ACEC is adjacent to CNP along the western border and Manti-LaSal NF along the southern border. It includes the area considered for designation as an ACEC or RNA for both Lavender Mesa and Bridger Jack Mesa (cross reference: Grazing Management, Part II).

Uses of adjacent public and private lands include recreation, grazing, and agricultural activities. These uses do not threaten the special value.

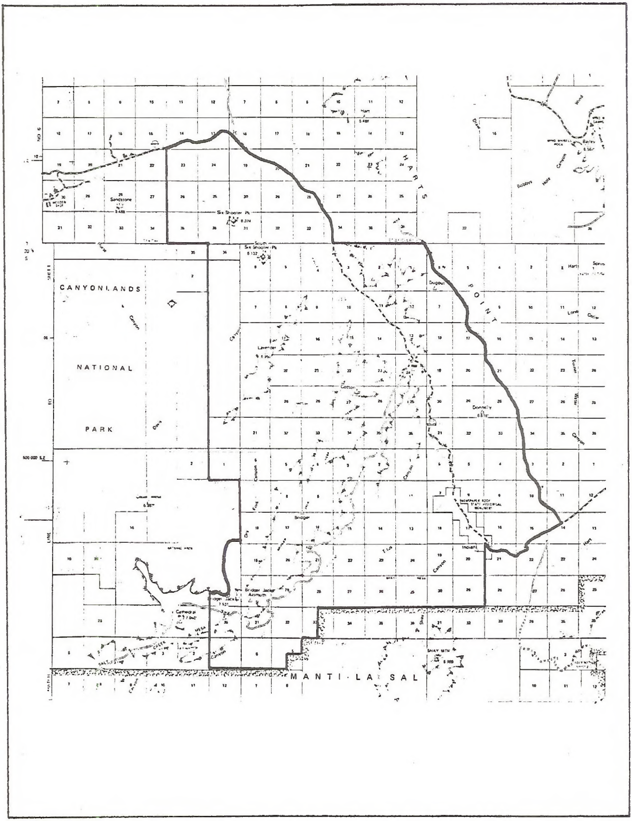

CANYONLANDS
NATIONAL
PARK
HARTS
POINT
MANTI-LA SAL
Six Shooter Pk
South Six Shooter Pk
Sandstone
Lavender
Cotton
Donnelly
Dugout
Bridger
Bridger Jack
Azimuth
Cathedral
Indian
Newspaper Rock State Historical Monument
Shay Mtn
Bobbys Hole Canyon
Bailey
Hart
Hart Spring
Lone Cedar
Tunnel Water Canyon

FIGURE 4331-3

North Abajo Potential ACEC

Alternative boundaries include consolidation with a potential scenic ACEC located just to the north (cross-reference: Recreation/ Visual Resources Management, Part II).

Possible management prescriptions to manage the ACEC include:

1. Special stipulations for development of mineral resources.
2. Control of recreational use through campground facility construction.
3. Patrols of the area.

An ONA designation could be used to protect the special cultural values found in this area by restricting surface disturbance. Management prescriptions would remain the same.

Documented public and state agency (Utah SHPO) interest includes concern over potential impacts to cultural resources caused by the DOE proposal to test and possibly site a high level nuclear waste repository in either Davis or Lavender Canyon, as well as support for wilderness designation of Bridger Jack Mesa.

Independent researchers (Van Pelt, 1978) have studied Bridger Jack Mesa to determine the suitability of all or part of the mesa top as either an RNA or an ONA. The recognized natural value is that of a near-relict plant association (cross-reference: Grazing Management, Part II). The Utah Wilderness Association (Warnick, 1985) has recommended Bridger Jack Mesa for designation as an ACEC.

Alkali Ridge

The Alkali area contains approximately 225,000 acres in the Monticello-Blanding proposed use allocation zone (see figure 4331-4). Cultural resources in this area are regionally and nationally significant because of the wealth of Basketmaker and Pueblo village sites.

Special management attention is required to protect the cultural resources in this area and prevent irreparable damage resulting primarily from heavy oil and gas exploration and development. Cultural resources in this potential ACEC are important, as demonstrated by the designation of the Alkali Ridge National Historic Landmark (figure 4331-5). Site densities often reach 200 per square mile. The cultural resources found here are irreplaceable and extremely vulnerable.

Heavy oil and gas exploration and development, intense pot hunting, and road maintenance are threatening cultural resources in this potential ACEC, especially in the Alkali area. Vegetative manipulation associated with grazing and agricultural activities has damaged cultural resources in the past. These existing uses threaten the special cultural values through direct impacts from heavy equipment, accelerated erosion, and increased access and consequent site visitation.

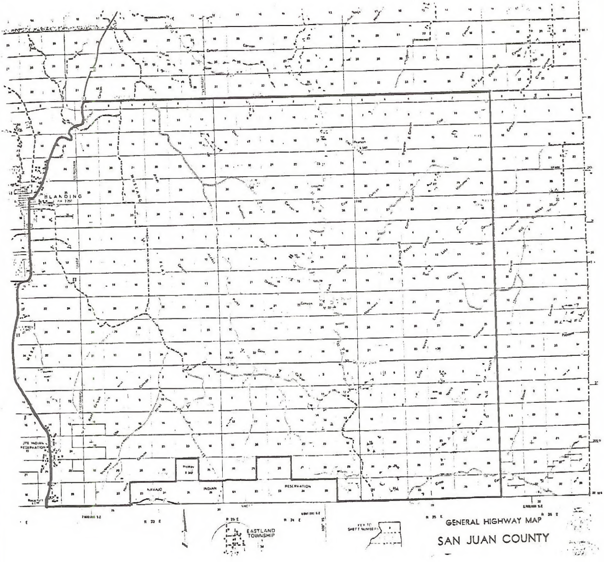

BLANDING
UTE INDIAN RESERVATION
NAVAJO
INDIAN
RESERVATION
Alkali
EASTLAND TOWNSHIP
KEY TO SHEET NUMBERS
GENERAL HIGHWAY MAP
SAN JUAN COUNTY

FIGURE 4331-4

Alkali Area Potential ACEC

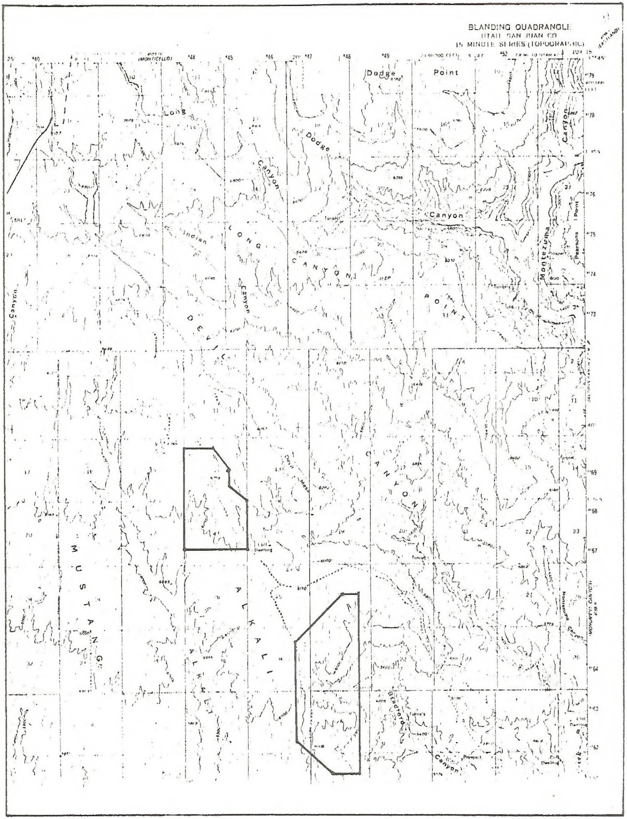

BLANDING QUADRANGLE
UTAH SAN JUAN CO.
15 MINUTE SERIES (TOPOGRAPHIC)
Dodge
Point
Long
Dodge
Canyon
Canyon
Montezuma
Canyon
Indian
LONG
CANYON
Canyon
POINT
DEVIL
MUSTANG
ALKALI
ALKALI
CANYON
Cliff Dwelling
Pearsons Point
MONUMENT CANYON
Prospect
Canyon

FIGURE 4331-5

Alkali Ridge National Historic Landmark

The majority of land within this potential ACEC is owned by the BLM, except for scattered state sections and private land holdings in Upper Mustang Flat and Montezuma Creek bottomlands. The entire area has been leased for oil and gas. Scattered uranium mining claims are also found in this area.

Uses of adjacent public and private lands include grazing and agricultural activities. As already mentioned, vegetative manipulation associated with these activities has severely impacted cultural resources; however, these uses are not now threatening the special values.

Possible management prescriptions to manage the ACEC include:

1. More restrictive stipulations for oil and gas exploration and development.
2. Increased compliance.
3. Requirement that energy companies conduct data recovery projects to mitigate indirect impacts.
4. Moratorium on vegetative manipulations.

There are no other special designations that would protect the cultural values in this potential ACEC. Although part of Alkali Ridge has been designated as a National Historic Landmark, the acreage is relatively small (see table 4331-1). Even if acreages were more extensive, this special designation alone would not adequately protect the cultural resources.

Documented public interest includes concern by the professional archaeologists over impacts to cultural resources caused by heavy oil and gas exploration and development and intense pot hunting in this potential ACEC.

Grand Gulch Archaeological District

The Grand Gulch Archaeological District contains approximately 4,000 acres in the Grand Gulch Plateau SRMA (see figure 4331-6). Cultural resources in this archaeological district are of regional, national, and worldwide significance because of the wealth of intact Pueblo cliff dwellings. Five major sets of data (artifacts, environment, stratigraphy, architecture, and rock art) are available for study.

Special management attention is required to protect cultural resources in this area and prevent irreparable damage resulting from increasing recreation use. The importance of cultural resources in this potential ACEC was demonstrated by the listing of the Grand Gulch Archaeological District in the National Register of Historic Places. Preservation of Basketmaker and Pueblo structures and cultural materials is excellent The fragile cultural resources found here are extremely vulnerable to adverse change.

Intense recreation use threatens the cultural resources in this archaeological district through surface collection, site trampling, pot hunting, and the consequent increase in erosion.

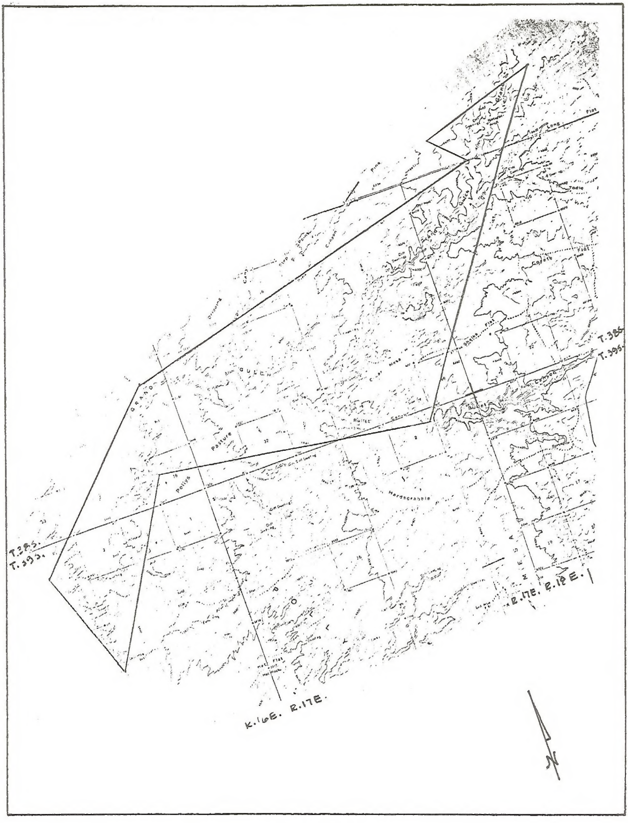

T.38S.
T.39S.
T.38S.
T.39S.
R.16E. R.17E.
R.17E. R.18E.
GRAND GULCH
Pine
Polly's
Pasture
Bullet Canyon
Hardscrabble
Long Flat
Todie
Coyote Flat
Snake Flat
Cedar Mesa
N

FIGURE 4331-6

Grand Gulch Plateau SRMA Potential ACEC

The entire area is administered by BLM and has been withdrawn from mineral entry.

Adjacent uses of public and nonpublic lands include recreation and grazing. These uses do not threaten the special value

Possible management prescriptions to manage the ACEC include:

1. Implementation of a reservation system.
2. Intensive inventory of the archaeological district.
3. Stabilization and data recovery.
4. Increase in foot patrols.

Wilderness designation (by Congress) would also protect the special values found here by eliminating development. However, cultural values outweigh wilderness values in the archaeological district and need to be the major emphasis in management. Thus, ACEC designation is more applicable. Management prescriptions would remain the same in either case, but would be easier to carry out if designated an ACEC. Wilderness designation involves tighter restrictions on management activities.

Documented public interest includes concern by the professional archaeologists, recreationists, other individuals, and the Utah SHPO over preserving the cultural resources found here for public and scientific uses.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

No other resource management programs actually constrain management of natural history, paleontological, or cultural resources. However, all activities that involve surface disturbance have the potential to disturb these resources.

DOCUMENTED PUBLIC CONTROVERSY

Public controversy over impacts to cultural resources is documented in the resource area files (see letters written by Abajo Archaeology, Division of Conservation Archaeology, and LaPlata Archaeological Consultants under SJRA file code 8100). Comments concerned impacts caused by oil and gas exploration and development and pot hunting.

Public controversy over the draft Grand Gulch Management Plan is documented in the resource area files (see letters in unofficial SJRA recreation files). Comments concerned the location and scale of future development, management constraints on use, and adequate treatment of cultural resources.

Public controversy over potential impacts to cultural resources caused by the DOE proposal to test and possibly site a high level nuclear waste repository in either Davis or Lavender Canyon is documented in the resource area files (see letters under SJRA file code 2000 DOE).

4332 WILDERNESS MANAGEMENT

CURRRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Wilderness Study Areas

RESOURCE OVERVIEW

There is no designated wilderness within the SJRA. The identified wilderness resources fall within WSAs and ISAs. In Section 603 of FLPMA, Congress directed BLM to evaluate all public lands for possible wilderness designation. The purpose of the evaluation is to help Congress decide which public lands should be preserved for their wilderness resources, and which are more suitable for other uses.

BLM's wilderness review process has three phases: inventory, study, and reporting.

The inventory phase for most units in Utah was completed in 1980 and resulted in the identification of WSAs. The inventory for the remaining units in the Moab District was completed in 1983. Inventory units or portions of units not identified as WSAs were dropped from further wilderness consideration.

During the study phase BLM examined each WSA and ISA under guidelines prescribed in "Wilderness Study Policy: Policies, Criteria and Guidelines for Conducting Wilderness Studies on Public Lands," published in the Federal Register on February 3, 1982. The draft SSAs prepared for each WSA and ISA document the results of the study phase.

In accordance with the Wilderness Study Policy, each WSA and ISA was evaluated against two standard criteria: evaluation of wilderness values; and manageability (as wilderness). In addition, a set of six quality standards for analysis were established: (1) energy and mineral resource values; (2) impacts of wilderness designation on other resources; (3) impacts of nondesignation (as wilderness) on wilderness values; (4) public comment; (5) local social and economic effects; and (6) consistency with other plans. The SSAs were prepared to document consideration of each of these criteria and standards.

In the SJRA, draft SSAs were presented to the public in March 1983 for a 120-day public comment period and in November 1983 for a 50-day public comment period. The final SSAs will incorporate information and concerns brought out by the public, and are scheduled to be published concurrently with the draft statewide wilderness EIS.

The draft statewide EIS is scheduled for completion in February 1986. The preliminary final EIS will mark the end of the study phase of the wilderness review. The EIS cannot be made final until completion of mineral surveys by the USGS and Bureau of Mines in accordance with FLPMA. This is expected to take up until 1990.

The reporting phase will report the study results and recommendations through the Secretary of the Interior to the President (required by FLPMA to be no later than October 21, 1991). The President will forward his recommendations to Congress within 2 years after receipt of each report from the Secretary. Congress will then decide whether any areas will be designated wilderness, and whether any areas will be released from wilderness review. WSAs and ISAs will remain under wilderness review until either designated as wilderness or formally released by Congress.

Within the SJRA, wilderness studies have taken place on 13 WSAs and 2 ISAs (see the WSA overlay and table 4332-1).

In addition, the Squaw Canyon and Cross Canyon WSAs have been analyzed by the San Juan Resource Area of the Montrose District, Colorado BLM in their RMP (BLM, 1984b). Under the proposed plan, both WSAs would be returned to multiple use management instead of being recommended to the Secretary for wilderness designation; however, the Colorado portions of the two WSAs are contained within the proposed Anasazi Cultural Multiple Use ACEC (BLM, 1984b). The wilderness suitability of the two WSAs is discussed in detail in the Wilderness Technical Supplement to the San Juan/San Miguel Draft RMP (BLM, 1984a).

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

The Wilderness Act, as passed by the Congress and signed into law on September 3, 1964, established the National Wilderness Preservation System. The preamble to the Act declared it to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. Elsewhere the Act states "wilderness areas shall be devoted to the public purposes of recreation, scenic, scientific, educational, conservation, and historical uses."

The BLM wilderness review program stems from section 603 of FLPMA. In FLPMA, Congress gave BLM its first unified, comprehensive mandate on how the public lands should be managed. The law establishes a policy of generally retaining the public lands in federal ownership and directs BLM to manage them under principles of multiple use and sustained yield.

Under FLPMA, wilderness preservation is part of BLM's multiple use mandate, and wilderness values are recognized as part of the spectrum of resource values and uses to be considered in the inventory and land use planning process. Section 603 of FLPMA specifically directed the BLM, for the first time, to carry out a wilderness review of the public lands.

Section 603(c) of FLPMA required BLM to manage the lands under wilderness review so as not to impair their suitability for preservation as wilderness. To carry out the management of WSAs until designation or nondesignation by Congress, BLM developed the IMP (BLM, 1979).

The IMP nonimpairment standard applies to all uses and activities except those specifically exempted by FLPMA (such as grandfathered uses).

IMP dictates that those grazing, mining, and mineral leasing uses that existed on October 21, 1976 (the date FLPMA was enacted), may continue in the same manner and degree as on that date, even if this would impair wilderness suitability. Lands under wilderness review may not be closed to appropriation under the mining laws in order to preserve their wilderness character. IMP recognizes valid existing rights and requires management to prevent unnecessary or undue degradation.

The areas that Congress designates as wilderness will be managed in accordance with the Wilderness Management Policy (BLM, 1981) and 43 CFR 8560 to ensure that their wilderness character will be preserved unimpaired. Opportunities will be provided for unimpairing uses such as recreational, scenic, scientific, educational, conservation, and historical pursuits. The Wilderness Management Policy also provides for certain activities, existing uses, and private rights that are generally nonconforming to wilderness use and preservation.

RESOURCE ALLOCATIONS

Until the passage of FLPMA, the BLM had no authority to identify or manage wilderness areas; the Wilderness Act did not apply to BLM administered lands. Areas with primitive recreation values suitable for wilderness use were designated as PAs (see 43 CFR 8352).

Section 603 of FLPMA extended the provisions of the Wilderness Act to public lands. The law provided that PAs be studied for wilderness suitability; these became ISAs. After an inventory to determine the presence of three primary wilderness values, BLM established WSAs. This was an administrative designation, but can be altered only by Congress.

Congress will designate wilderness areas, presumably from among those WSAs and ISAs that BLM has studied, found suitable for wilderness designation, and recommended as such to the President.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

WSAs and ISAs are managed under IMP (BLM, 1979).

The resource area contains two ISAs, Grand Gulch PA and Dark Canyon PA. These two ISAs would not maintain their primitive designations if not designated wilderness by Congress. The Bridger Jack Mesa WSA (UT-060-167) had been proposed as an ONA prior to the passage of FLPMA, but was never designated as such.

Current planning is silent on wilderness management, as the MFPs predate the wilderness inventory and review.

TABLE 4332-1

Wilderness Study Areas in the SJRA

WSA Number	WSA Name	Acreage	Contiguous Units	Acreage
UT-060-001	Dark Canyon ISA[a]	62,040	Dark Canyon Wilderness, Manti-LaSal NF Dark Canyon proposed wilderness, GCNRA Needles proposed wilderness, CNP	60,000 18,100 61,182
UT-060-002	Grand Gulch ISA[b]	[c]37,580	San Juan proposed wilderness, GCNRA	13,010
UT-060-164	Indian Creek WSA	6,870	Maze proposed wilderness, CNP	105,980
UT-060-167	Bridger Jack Mesa WSA	5,290		
UT-060-169	Butler Wash WSA	22,030	Needles proposed wilderness, CNP	61,182
UT-060-171	Middle Point WSA[a]	5,990		
UT-060-181	Mancos Mesa WSA	51,440	Moki-Mancos proposed wilderness, GCNRA	41,700
UT-060-188	Pine Canyon WSA[b]	10,890		
UT-060-191	Cheesebox Canyon WSA	15,410		

UT-060-196	Bullet Canyon WSA[b]	8,520		
UT-060-197/198	Slickhorn Canyon WSA[b]	45,390	Same as for UT-060-002, Grand Gulch ISA	
UT-060-201	Road Canyon WSA	52,420		
UT-060-204	Fish Creek WSA	46,440		
UT-060-205B	Mule Canyon WSA	5,990		
UT-060-224	Sheiks Flat WSA[b]	3,140		
UT-060-227	Squaw Canyon WSA	6,580	CO-030-265A, Squaw Canyon WSA, Montrose District, Colorado BLM[d]	4,611
UT-060-229	Cross Canyon WSA	1,000	CO-030-265, Cross Canyon WSA, Montrose District, Colorado BLM[d]	11,734

[a] The Dark Canyon ISA combines with the Middle Point WSA to form the Dark Canyon Complex, with a total acreage of 68,030.

[b] The Grand Gulch ISA combines with the Pine Canyon, Bullet Canyon, Slickhorn Canyon, and Sheiks Flat WSAs to form the Grand Gulch Complex, with a total acreage of 105,520.

[c] The Grand Gulch ISA acreage, recalculated especially for the San Juan MSA from the master title plats, is actually 37,807 acres. For consistency with the statewide wilderness EIS, however, this table contains the acreage figure that was used in the wilderness inventory. The difference between the two figures amounts to 0.6 percent.

[d] Refer to BLM, 1984a and BLM, 1984b for suitability recommendations for Colorado BLM's Squaw Canyon and Cross Canyon WSAs.

SOCIOECONOMIC CONSIDERATIONS

Because there are no designated wilderness areas, no socioeconomic discussion is warranted. See the draft SSAs and the draft statewide wilderness EIS for a detailed discussion of existing economic activities in WSAs and potential economic impacts of having these areas designated as wilderness.

CONSISTENCY WITH NON-BUREAU PLANS

See the draft SSAs and the draft statewide wilderness EIS.

DATA GAPS

None identified.

RESOURCE CAPABILITY ANALYSIS

See the draft SSAs and the draft statewide wilderness EIS.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

BLM currently manages no wilderness areas. WSAs and ISAs are managed under IMP. While IMP management has at times been controversial, BLM management has been upheld when challenged (see Utah Wilderness Association, 80 IBLA 64, March 30, 1984).

MANAGEMENT OPPORTUNITIES

See the draft SSAs and the draft statewide wilderness EIS.

The role of the RMP will be to decide, from alternative proposals, how WSAs and ISAs will be managed if not designated as wilderness and dropped from the wilderness review process by Congress.

ACEC POTENTIAL

The qualities that led to designation of each WSA or ISA would also provide potential for an ACEC or other special designation for all or part of each WSA or ISA. The relevant and important natural values (see 43 CFR 1610.7-2) are documented in the draft SSA prepared for each area. ACEC potential is documented in other chapters of this MSA (cross-reference: Grazing Management, Natural History/Cultural Resources Management, and Recreation/Visual Resources Management, Part II).

The WSAs and ISAs also have potential for other special designations. Most have ONA potential under 43 CFR 8352, to be managed for maximum recreation on lands with unusual natural characteristics (cross-reference: Grazing Management, Natural History/Cultural Resources Management, and Recreation/Visual Resources Management, Part II). This would generally involve more intensive management than under current conditions or under wilderness designation alone.

One WSA, Bridger Jack Mesa, has potential as an RNA under 43 CFR 8223 (cross-reference: Grazing Management and Natural History/Cultural Resources Management, Part II). This would emphasize scientific study over recreational use. Another possible designation would be as a Natural Resources Experiment and Research Area under 43 CFR 2071.1. These are discussed elsewhere and are not repeated here.

Several sites within WSAs and the ISAs have potential as National Natural Landmarks, designation to the National Register of Historic Places, or other designations to recognize specific sites (cross-reference: Natural History/Cultural Resources Management, Part II). These are discussed elsewhere in this MSA amd are not repeated here.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

See the draft SSAs and the draft statewide wilderness EIS.

DOCUMENTED PUBLIC CONTROVERSY

Public comment on the draft SSAs in the Moab District is summarized in table 4332-2.

Public comment on the wilderness inventory was extensive; documentation may be found at the MDO.

Public comment is occasionally received on IMP management. This is available in the IMP files maintained for each WSA and ISA at the MDO.

TABLE 4332-2

Public Comment Summary, San Juan Resource Area Draft SSAs
(Number of Comments)

General Preference	
All Wilderness	199
Partial Wilderness	23
No Action	179
No Wilderness	3
No Preferred Alternative	13
	417

Geographic Origin	
Local (same county)	24
Regional (same district)	152
Other Utah	134
Non-Utah	107
Unknown	0
	417

Affiliation	
Local Government	10
State Government	10
Federal Government	4
Industry	35
Environmental/Conservation Group	32
Academia	0
Individual	322
Other	4
	417

4333 RECREATION MANAGEMENT/VISUAL RESOURCES MANAGEMENT

INTRODUCTION

The 4333 subactivity as administered by the BLM includes management of both recreation and visual resources. All recreation management is charged to this code. VRM impact assessment (contrast rating) work is charged to the benefitting activity, and inventory work is charged to 4333 when it does not relate to a specific project.

Recreation Management and VRM are discussed separately under 4333. Page headers will change at the end of Recreation Management to mark the beginning of the VRM section.

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Recreation Opportunity Spectrum Classes.

Recreation Management Areas and Facilities.

RESOURCE OVERVIEW

The SJRA attracts recreationists from throughout the United States and abroad. White water rafting, backcountry use, archaeological observation, recreational ORV use, and sightseeing are the major activities. They occur mainly in the primitive, semiprimitive nonmotorized, and semiprimitive motorized ROS settings; sightseeing occurs mainly in the roaded natural setting. The San Juan River and the deeply incised canyons of the SJRA (cross-reference: Topography, Part I) contribute to these activities.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

National Laws

FLPMA provides for management of outdoor recreation and human occupancy of the public lands. Section 202(c)(9) calls for land use planning consistent with statewide outdoor recreation plans.

The Wild and Scenic Rivers Act of 1968, as amended, provides for protection of outstanding river resources. It requires the identification and study of rivers or portions of rivers (wild and scenic, recreational) and directs federal agencies to cooperate with state governments.

Other national laws that govern recreation management include the National Trails System Act of 1968, as amended; the Land and Water Conservation Fund Act of 1964, as amended; and the Recreation and Public Purposes Act, as amended.

Executive Orders

EO 11644, Use of ORVs on Public Lands, establishes policies and procedures for control of ORV use on public lands to protect resources, promote safety, and minimize conflicts.

An amendment to EO 11644 gives federal agencies the authority to close or limit areas or trails to ORV use when necessary to protect soils, vegetation, wildlife, wildlife habitat, or cultural or historic resources.

Regulations

Regulations for special designations of areas and sites are found at 43 CFR 2070 (see also 43 CFR 8223 and 8352).

Regulatory direction for specific recreation programs (e.g., policy, authority, use permitting, etc.) is found at 43 CFR 8000 thru 8372.

Management of ORV use is regulated under 43 CFR 8340. Implementation of these rules will provide for continued ORV use under conditions that will protect natural resources, promote safety, and minimize conflicts among various land uses.

Memorandums of Understanding

A cooperative management agreement for recreational use of the San Juan River from Mexican Hat to Clay Hills Crossing between the Moab District and GCNRA was signed in 1979. The SJRA administers the permitting process, both commercial and private, and other resource management actions are cooperatively determined.

RESOURCE ALLOCATIONS

The BLM is required to allocate ORV use by designating all the lands within the resource area as open, closed, or limited for ORV use (see 43 CFR 8342). This is done through the RMP process by resolving conflicts among various surface uses in the RMP/EIS. The designations do not distinguish between recreational and nonrecreational ORV use.

The RMP could also serve as a basis for designation of RNAs (43 CFR 8223) or ONAs (43 CFR 8352) (cross-reference: Natural History/ Cultural Resource Management, Part II).

Additional allocations that could be made include the designation of SRMAs and ROS opportunity classes.

SRMAs are designated administratively by the Area Manager under 43 CFR 8372.0-5. These are areas recognized as requiring special management and control to ensure their protection. Examples are areas where intensive management actions are required to reduce resource damage, solve visitor health and safety problems, mitigate conflicts, or provide the public with scarce recreation opportunities that would be unavailable without special management. Recreational use in an SRMA may or may not require a special recreation permit (see 43 CFR 8372.1).

The RMP/EIS could serve as a basis for identifying areas where resource use conflicts could be managed through designation of a SRMA.

The ROS provides the conceptual framework for inventory, planning, and management of the recreation resource. The ROS recognizes that people want and need different recreational experiences, and that the resource base is not uniform; its potential for providing recreation experiences varies.

The ROS provides a tool for the manager to characterize demand for various types of recreational settings and opportunities and the capability of the resource to provide such experiences. It allows all possible combinations of recreational experience, setting, and activity opportunities to be arranged along a continuum. To facilitate its use in planning, the ROS is divided into six classes: primitive (P); semiprimitive nonmotorized (SPNM); semi-primitive motorized (SPM); roaded natural (RN); rural (R); and modern urban (U). Each class is defined in terms of a combination of activity, setting, and experience opportunities (see appendix 4333-A at the end of this chapter).

The ROS classes are established as a result of an inventory, and while used as an analysis tool in the RMP process, do not derive from it. Table 4333-1 shows the approximate acres in each ROS opportunity class in the SJRA.

In the past the BLM recognized areas with primitive recreation values by designating PAs (see 43 CFR 8352). This type of value will in the future be recognized by Congressional designation of wilderness areas (cross-reference: Wilderness Management, Part II). All BLM PAs were designated ISAs under Section 603 of FLPMA. After completion of the BLM wilderness review and Congressional action on ISAs, the PA designation will be dropped.

PAs are managed to maximize primitive recreation use, minimize interference with natural ecological processes, and preserve the primitive recreation values of solitude, inspiration, and mental and physical challenge.

To preserve the primitive characteristics, use of a PA is constrained. Mechanized means of transportation and landing aircraft are not allowed, except for emergency or administrative operations. Facilities cannot be constructed, except in connection with authorized nonrecreational uses of the lands as necessary to protect and administer the area. Nonrecreational activities are authorized only under specified conditions.

The RMP can be used to determine how PAs will be managed if not designated as wilderness by Congress. Alternative designations, if found to be appropriate, can be made through the RMP process, regardless of the eventual action of Congress on wilderness suitability recommendations.

TABLE 4333-1

ROS Classes, by Area (approximate acres)

	Opportunity Class						
Area	P	SPNM	SPM	RN	R	U	Area Total
San Juan River SRMA	0	0	6,100	2,730	130	40	9,000
Grand Gulch Plateau SRMA	69,700	195,600	37,200	82,500	0	0	385,000
Dark Canyon SRMA	38,550	23,490	0	0	0	0	62,040
San Juan Extensive RMA	90,270	293,370	284,360	640,280	14,590	280	1,323,150
Totals	198,520	512,460	327,660	725,510	14,720	320	1,779,190

Designation of a river or river segment to the National Wild and Scenic Rivers System is made by Congress under the Wild and Scenic Rivers Act. The NPS conducts studies to determine the eligibility of a designated study river as wild, scenic, or recreational. The RMP/EIS could be used to compile analyses for the NPS to use in any assessment it might prepare, but not to make recommendations of eligibility or designate rivers or portions of rivers to the system.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Three areas (the San Juan River, Grand Gulch Plateau, and Dark Canyon PA) have been designated SRMAs since 1981. The majority of the recreation program is geared toward management of these areas. Each area will be discussed individually in the following sections.

The remaining portion of the SJRA has been designated as the San Juan Extensive RMA. On these lands, most recreation use is dispersed, and resource protection and user conflict resolution needs are at lower levels than within SRMAs. While recreation management is sometimes needed in this area, it is of lower priority than within SRMAs. These three SRMAs and recreation facilities are shown on the Recreation Management Areas and Facilities overlay.

The public lands in the resource area (as of 1984) can be classified into the six ROS opportunity classifications as shown on the ROS Classes overlay. The number of acres of each setting within each of the recreation management areas, as determined through ROS inventory procedures, is shown in table 4333-1.

The recreational activities on public lands in the resource area include, among others, camping, hiking, nature study, photography, big and small game hunting, ski touring, snowmobiling, showshoeing, swimming, fishing, canoeing, river running, ORV use, picnicking, rock collecting, auto touring, and enjoying scenery and natural features. The activities can be pursued within one or more of the setting classes.

Current management is described separately for each of the SRMAs and the extensive RMA.

San Juan River SRMA

The San Juan River SRMA encompasses the north side of the San Juan River from Montezuma Creek 104 miles downstream to Clay Hills Crossing (see the Recreation Management Areas and Facilities overlay). The south bank of the river is within the Navajo Reservation and not managed by BLM. The north side of the river from about mile 18 (below Mexican Hat) to Clay Hills Crossing is within GCNRA. The SRMA averages about 0.25 mile in width.

The SRMA totals about 9,000 acres. Based on the ROS inventory, use within the San Juan River SRMA occurs primarily in an RN setting upstream from Sand Island (about 2,500 acres) and in an SPM setting downstream from Sand Island (about 6,500 acres).

The basic criteria for management of the San Juan River were outlined in the Federal Register (page 3642) published January 15, 1981 titled "Utah; River Running Recreation Use Permits and Allocations; Updated Criteria and Procedures." This outlined the need for commercial and private permits, use limits, party size restrictions, and permit stipulations for resource protection and visitor safety (appendix 4333-B at the end of this chapter).

Use and Management

The use of the San Juan River has increased steadily by about 15 percent per year over the past 5 years (see table 4333-2). Use last year (in 1984) amounted to 33,599 user days; of this, 9 percent was commercial and 91 percent was private. This mix has remained fairly constant since 1980. The majority of use occurs from April 15 to July 15, when higher river flows occur; however, the river generally can be run year-round.

The seasonal ranger staff, which varies from one to four rangers, attempts to contact all rafting groups when they are putting in. They check for permit compliance, and these personal contacts are believed to be largely responsible for the generally good condition of the river corridor. This portion of the ranger job requires about 12 work months per year; however, for the past 3 years (FY 1982 thru FY 1984) funding levels have been below this figure.

The San Juan River has been listed as a potential study river under the Wild and Scenic Rivers Act amendment of 1975. The NPS has not begun any studies to determine its eligibility, in whole or in part, for designation.

Facilities

San Juan River trips originate at three locations: Sand Island recreation site (77 percent), Mexican Hat (17 percent), and Montezuma Creek (6 percent) (see table 4333-3). The Clay Hills Crossing (in GCNRA), used as a takeout for San Juan River trips, is also used as a launch site for trips to Lake Powell.

The Sand Island recreation site is the only developed launch point on the river. It also serves as a camping and picnic area for local and nonlocal use not associated with river running. The site contains five camp units and two picnic units, each with picnic tables and grills. Informational displays, rest rooms, and garbage cans are also provided. During the months of April, May, and June the campsites are often full, and camps are set up in unauthorized locations at the recreation site. This period appears to be the main use season for both river runners and land based tourism, which causes the over crowding at the campsites.

The site is also used by the local population as a party spot, particularly on weekends. This results in conflicts with campers at Sand Island due to loud late-night activities. Vandalism, including driving off roads, littering, and destruction of vegetation (for fire building) is associated with this activity. On the cliff face within the campground are about 20 petroglyphs which have been vandalized with pecked or painted graffiti.

TABLE 4333-2

San Juan River Use, 1980 through 1984
(User Days)

	1980	1981	1982	1983	1984
Private	20,398	15,948	18,945	22,217	28,419
Organized Groups	1,015	1,896	2,140	1,503	2,174
Commercial	2,552	2,635	2,588	3,625	3,006
Totals	23,965	20,479	23,673	27,345	33,599

NOTE: Based on an average of the past 5 years (1980 to 1984), private use amounts to 82 percent; private (organized groups), 7 percent; and commercial, 11 percent.

TABLE 4333-3

San Juan River Use Locations, 1984
(Percent of User days)

From:	Mont. Creek	Mont. Creek	Mont. Creek	Sand Island	Sand Island	Mex.Hat
To:	Sand Island	Mexican Hat	Clay Hills	Mexican Hat	Clay Hills	Clay Hills
Private	1	2	9	14	48	26
Private (Educational)	3	0	11	26	52	8
Commercial	0	0	0	39	34	27
Percent of Total Use	1	2	9	18	46	26

Just west of the Sand Island campground is a large petroglyph panel (100 yards long with over 200 symbols). It is listed on the National Register of Historic Places (cross-reference: Natural History/Cultural Resource Management, Part II). Fencing protects a portion of this panel, and informational signing is provided. Vandalism (other than littering) has not been a problem at this location.

Due to the substantial day and overnight use at Sand Island, maintenance is a continual need. From May 1 through September 30, a contract for twice-a-week garbage pickup is awarded (1984 cost: $1,200). During this period a river ranger also visits the site daily, picking up scattered litter and emptying the garbage cans at least one additional time per week. Also during this period a twice-a-week restroom cleaning contract is awarded (1984 cost: $1,200). The rest rooms have a 75-gallon holding tank, which must be dumped into a 500-gallon vault. The dumping process must be done about every 5 days during the high use season (April through July) and about four times the rest of the year. This is done by support personnel from the resource area office and requires about 2 work months per year. The vaults require pumping about four times per year and are done on contract (1984 cost: $1,300). General maintenance, such as upkeep on picnic tables, grills, and fencing, is done by the river rangers; resource area support requires about 1 work month per year and $1,000 in materials. Major maintenance is done by Moab District operations staff. During 1984, rock barriers were installed, and a portion of the parking area was graveled. This required about 1 work month. Estimated maintenance by the operations staff would be 1 work month every 3 years.

The Mexican Hat launch and takeout site is undeveloped. A dirt road goes from U.S. Highway 191 to the river; however, BLM does not currently have legal access on this road. An easement across private lands is being negotiated and is expected to be completed in FY 1985. The site consists of an area cleared of vegetation for access to the river, a parking area, and an informational sign.

The Mexican Hat site is also used frequently by local residents as a party spot, resulting in a large amount of litter, tire burning, and human waste. Several vehicles have been vandalized at this site (four in 1984), perhaps due to its isolated location and the lack of overnight campers. The rangers suggest to river runners that vehicles not be left overnight at this site.

From May 1 to September 30, the river rangers visit this site daily to check permits and pick up the litter. About 2 work months per year are spent on this maintenance activity.

The Montezuma Creek launch point is within the Navajo reservation and consists of an open area adjacent to the bridge. BLM has no legal access to the site; however, informal contact with the Navajo rangers indicates they have no objections to boaters launching there, but overnight camping and alcohol consumption are not allowed. No maintenance is performed at this site.

The Clay Hills Crossing takeout point is within GCNRA and is accessed via County Road 278 (dirt) for 11.5 miles to U-263. The site is also a put-in for boating on Lake Powell. There are no developments. During April and May the site can be very muddy, making takeout or put-in very difficult. Over 5,000 people used this site in 1984. This use, coupled with a lack of garbage and human waste facilities, has created unsanitary conditions as piles of human waste and litter are evident.

Campsites (all undeveloped) along the river are not assigned, but several locations, each less than 10 acres, are used almost every night from April 15 to July 15. Ranger patrols check these campsites about every other week from May 1 to September 30. Litter, human waste, charcoal, and fire rings are removed. These patrols, which are also permit compliance checks, require about 6 work months per year.

At Butler Wash, photo trends show loss of vegetation, multiple trailing, and exposed cottonwood tree roots. Some of this is due to use by boaters and some due to other resource use, primarily unauthorized grazing. This site is also accessible by overland vehicle travel.

At Comb Wash, the lack of ground cover (vegetation) is shown by photo trends, as is the loss of lower branches of cottonwood trees. The lack of driftwood for fires at this site has probably resulted in the loss of the branches. The loss of ground cover is most likely due to recreation and unauthorized grazing. Overland vehicle access is possible at this location.

At Eight Foot Rapid campsite, on the Navajo reservation, some loss of vegetation on the upper bench is evident. The hogan at this site is occasionally altered by boaters using it as a shelter.

At Honaker Trail, impacts to the main beach are reduced by periodic flooding. Several locations, being used as sleeping sites, show loss of vegetation.

The Johns Canyon campsite (within GCNRA) shows evidence of increasing use, with camping and kitchen use areas being hollowed out of the tamarisk vegetation. Human waste burial is becoming a problem.

Slickhorn Canyon (within GCNRA), the most heavily used site below Mexican Hat and perhaps on the river, shows signs of multiple trailing, expanding campsites, and increased human waste burial.

At the mouth of Grand Gulch (within GCNRA), the high lake levels (elevation 3,712) of Lake Powell since 1981 have caused the river elevation to rise, flooding the beach. Camping is currently limited to the rock bench 10 feet above the river level. Access to this bench is difficult, limiting use. The loss of this campsite and limited campsites from here to Clay Hills Crossing have put additional demands on Slickhorn as a final night's campsite.

Planning Guidance

The SRMA falls under the Montezuma and South San Juan MFPs. The plans are silent on river management.

In 1979 the SJRA and GCNRA began the scoping process for a management plan for the San Juan River. The management objectives for this plan were to

- maintain the scenic quality and the natural character of the canyon environment from Montezuma Creek to Lake Powell;
- provide a continuing opportunity for a quality wilderness experience between Mexican Hat and Lake Powell;
- protect the cultural values within the canyon while allowing for their enjoyment;
- provide for a diversity of recreational opportunities that are in harmony with the canyon environments from Montezuma Creek to Lake Powell;
- provide for the equitable distribution of use to a broad spectrum of the public; and to
- provide for safe and lawful use of the river corridor.

Comments were received on these objectives, and an EA was begun. Due to a lack of BLM and NPS funding, the EA and management planning activities were halted in 1981 and have not been resumed.

Grand Gulch Plateau SRMA

The Grand Gulch Plateau SRMA is located in southeastern Utah, approximately 25 miles east of Blanding and 10 miles north of Mexican Hat. It is bordered on the north by the Manti-LaSal National Forest, on the east by Butler Wash, on the west by Highway U-263 and Clay Hills Crossing road, and on the south by GCNRA and U.S. Highway 163. It comprises approximately 385,000 acres of public lands, approximately 33,000 acres of State of Utah land, and fewer than 1,200 acres of private land. The Grand Gulch Plateau is covered by the pinyon-juniper vegetation type and has an average elevation of 6,000 feet. It is cut by numerous deep, narrow, winding canyons (Grand Gulch being the largest) which drain directly into Comb Wash to the east and the San Juan River on the south.

The area is relatively undeveloped. Access is provided by Highway U-95 on the north; Highway U-261, which runs through the middle of the Grand Gulch Plateau; and numerous dirt roads on the mesa top. The rugged canyons are relatively undisturbed.

The archaeological resource of the Grand Gulch Plateau area is very rich. The Grand Gulch Archaeological District is on the National Register of Historic Places (cross-reference: Natural History/Cultural Resource Management, Part II). The area was extensively occupied by the Anasazi culture from before A.D. 500 to 1270. In surveyed areas, site densities of 20 to 200 sites per square mile have been recorded. The sites are of many types, and include lithic scatters, petroglyph and pictograph panels; Basketmaker pit houses and pit structures; and Pueblo kivas, multi-room surface dwellings, granaries, and cliff dwellings. Many are nearly or totally intact. The area probably contains the greatest concentration of Basketmaker II and III sites in the Southwest. Grand Gulch is known particularly for its well preserved cliff dwellings and variety of pictographs and petroglyphs. Even though numerous artifacts have been removed from the area, both legally and illegally since the 1890s, an enormous amount of material remains for scientific study by archaeologists.

In 1970 BLM designated 32,847 acres of the Grand Gulch drainage as a PA; 4,960.16 acres were added in 1977 (37,807.16 acres total). Grand Gulch PA is an ISA in the BLM wilderness review. The SRMA also contains the Pine Canyon, Bullet Canyon, Slickhorn Canyon, Road Canyon, Fish Creek Canyon, and Mule Canyon WSAs (cross-reference: Wilderness Management, Part II). A total of 210,870 acres (about 55 percent of the SRMA) is contained in the ISA and WSAs. This area is managed under IMP. IMP has not constrained the recreation management of these areas, and may have served to enhance the opportunities present.

Use and Management

The Grand Gulch Plateau SRMA provides a range of ROS settings for recreation activities (see table 4333-1). About 70,000 acres of P and 196,000 acres of SPNM are present. These acres are mainly located in the canyons (except Arch Canyon and lower Johns Canyon) and adjacent mesas. The remaining acreage is in the SPM (about 37,000 acres) and RN (about 82,000 acres). This acreage occurs along existing roads and travel routes, including Comb and Butler Washes.

Visitor use within the SRMA is monitored to the extent possible under funding limitations (see table 4333-4). Kane Gulch ranger station, 4 miles south of U-95 on U-261, is a center for visitor registration and information for much of the plateau and is manned as volunteer and temporary personnel are available, primarily in the spring and fall. The station is open sporadically during other seasons of the year.

Permits are not required for private use within the SRMA, but are required for commercial and organized (noncommercial and educational) groups. Limitations on the number of commercial permits, group size, and parties using horses or mules have been imposed and enforced within the Grand Gulch PA and, to a lesser degree, within the remainder of the SRMA. Except on periodic vehicle patrols, visitor use in Comb Wash, Butler Wash and other vehicle use areas has not been intensively monitored.

TABLE 4333-4

Grand Gulch Plateau SRMA Visitation

Major Canyons and Day Use Sites	Private Use	Non-commercial Organized Groups	Commercial	Total
Grand Gulch PA (visitor use days)				
1982	9,249	2,603	1,390	13,242
1983	13,171	1,586	1,970	16,727
1984	12,333	2,464	2,724	17,521
Fish and Owl Creek Canyons (visitor use days)				
1982	1,993	1,074	1,211	4,278
1983	2,123	1,060	574	3,757
1984	3,041	1,412	1,710	6,163
Slickhorn Canyon (visitor use days)				
1982	602	262	60	924
1983	505	918	124	1,547
1984	380	228	64	672
Arch Canyon (visitor use days)				
1982				269
1983				282
1984				482
Mule Canyon (visitors)				
1982				4,466
1983				6,505
1984				6,444
Butler Wash Indian Ruins (visitors)				
1982				Unknown
1983				2,425
1984				3,910

Source: BLM records.

Visitor use of the plateau is estimated from visitor registration forms completed at the SJRA office, the Kane Gulch Ranger Station, or by patrolling ranger personnel, and from trailhead registers at Grand Gulch PA, Collins Spring, Kane Gulch, Bullet Canyon, Owl Creek drill hole, Arch Canyon, and Moon House ruin site. Other registers are located at Mule Canyon Ruin and Butler Wash Ruin, both of which are day use sites along U-95.

Use in other canyons, where registers are not present, is relatively unknown, except from information provided by patrolling rangers. No attempt has been made to estimate visitor use in these areas.

Use of the plateau has increased substantially since intensive management was initiated in 1974. Annual peak visitor use, however, has remained relatively constant, with heaviest use in April, May, and June. A smaller peak occurs in October and November.

An average of 6 work months were available in FY 1984 for temporary employees assigned to the Grand Gulch Plateau. Student Conservation Association and BLM volunteers have mitigated the lack of sufficient work months for seasonal employees.

Facilities

A contract for sewage disposal at Kane Gulch is in effect from May 1 to September 30, requiring service approximately three times during this period (frequency depends on continual or sporadic temporary residency at the adjacent trailers). This contract includes the toilet facilities and trash pickup at Mule Canyon Ruins adjacent to U-95 at an FY 1984 cost of $1,800.

Mule Canyon Indian Ruins, a day use archaeological interpretive site, receives the highest visitor use within the Moab District. In 1984, 6,444 persons visited the site, according to visitor register information located near the parking area. In FY 84, the BLM constructed an interpretive ramada near the partially restored ruins. Rangers routinely check the area and supply San Juan County Travel Council brochures for the display.

Butler Wash Indian Ruins, an Anasazi ruin partially stabilized in 1974 by the NPS, has seen a substantial increase in visitation since development of a trail and sign system in 1984 (2,425 visits in 1983; 3,910 visits in 1984). Trail maintenance, trash collection, supplying brochures, and trail register collection at Mule Canyon and Butler Wash require about 1 work month per year. Trash pickup and general maintenance of the Butler Wash parking area is done by the UDOT. No toilet facilities are provided at Butler Wash.

Due to terrain and limited access, visitor use conflicts have been extremely limited, although motorcycle tracks in portions of the PA were observed twice in 1983 and 1984. Arch Canyon, lower Mule Canyon and lower Fish Creek Canyon can be accessed by ORVs, but have provided no major conflicts between user groups. Some disagreement has existed in past years between backpackers and ranchers over cattle use in recreation use areas, primarily within the PA.

Although still present, vandalism to archaeological sites within the SRMA has been somewhat reduced. This reduction can possibly be attributed to visitor cooperation and education and the presence of ranger personnel. It can be assumed that vandalism continues to be prevalent and on the increase in other parts of the resource area where routine patrols are not conducted.

Even with an estimated 25,000 visitor use days within the SRMA, a law enforcement presence is almost never required, except in cases of archaeological resource vandalism.

Most major campsites (all undeveloped) within the Grand Gulch PA show signs of substantial use. Annual photo trend studies at Junction Ruin, Turkey Pen, Split Level and Bullet Canyon/Grand Gulch campsites reveal large fire rings, reduction of fuel wood supply and increasing loss of vegetation. Similar conditions exist in the cottonwood grove at the head of Arch Canyon, as well as at Comb Wash (south of U-95) and several sites in the lower portion of Grand Gulch.

Safety has always been of primary concern within the Grand Gulch Plateau SRMA due to remote, rugged terrain and precipitous slopes leading to archaeological sites. Only three incidents have required evacuation assistance since 1980.

Planning Guidance

The SRMA falls under the South San Juan MFP, which lists several management objectives. The MFP directs that the PA be managed to provide for protection of archaeological and primitive recreation values. Other planning objectives, which are still pending, include development of interpretive sites at Comb Ridge, Salvation Knoll, and Salvation Crossing; inventory areas for rockhounding; designating the area open to ORV use except for the PA, Valley of the Gods, Nokai Dome, Slickhorn Canyon, Johns Canyon, Fish Canyon, Mule Canyon, and Arch Canyon; and studying these areas for PA designations.

A management plan for Grand Gulch Plateau was drafted in 1980, and a public comment period established. This comment period was extended from November 30, 1980 until January 1, 1981 in response to a request from the public. During the comment analysis and internal review, it became apparent that some of the management actions proposed in the plan could not be implemented prior to development of an areawide RMP/EIS. Decisions on grazing allocations, oil and gas leasing categories, ORV use and other special designations were deferred until an RMP could be completed.

To guide management of recreation and cultural resources until the RMP/EIS could be developed, an interim management plan was completed in August 1981.

The interim plan, although not fully implemented, is the primary basis for current management. The plan provides for a wide variety of recreational experiences within a framework of resource protection, and recognizes three main objectives: to preserve the cultural resources; to maintain and enhance the area's natural character, isolation, solitude, inspirational value, and scenic quality; and to optimize recreational values.

The interim plan recognizes a dramatic educational and recreational opportunity for enjoying the preserved remnants of a past culture within a pristine environmental setting. The scenic quality, enhanced by unique geologic features, and the natural character of the canyon environment, which provides sanctuary for birds, animals, and plants, are important elements of the recreation demand in the area.

It is the intent of the interim plan to prevent developments that would damage the natural values or intrude upon the visual quality.

Not all facets of the plan have been implemented, due to shortages in funding and personnel.

Dark Canyon SRMA

The Dark Canyon SRMA has the same boundaries as the Dark Canyon PA (62,040 acres). This includes Dark Canyon with its side canyons (Lost, Lean-To, Youngs, and Black Steer), as well as Bowdie Canyon, Gypsum Canyon, and Fable Valley. This area was designated a PA in December 1970 to protect its scenic, recreational and other values. Current management is based on the objectives for PAs found in 43 CFR 8352. Dark Canyon PA is an ISA in the BLM wilderness review and, as such, is managed under IMP (cross-reference: Wilderness Management, Part II). Recreation management of the SRMA has not been constrained by IMP, and may have been enhanced.

The lower portions of Dark Canyon (3 miles), Bowdie Canyon (2 miles), and Gypsum Canyon (3 miles) are within the GCNRA and are proposed for wilderness designation. The upper portion of Dark Canyon is within the Manti-LaSal National Forest. This portion was designated in 1984 as the Dark Canyon Wilderness Area, encompassing about 50,000 acres.

The Dark Canyon SRMA contains the largest block of ROS P setting in the resource area, approximately 38,550 acres. It covers the major canyons of the SRMA. The remaining portion is in the ROS SPNM setting and includes Fable Valley and the peripherial portions of the SRMA (approximately 23,490 acres; see table 4333-1).

Use and Management

Use of Dark Canyon PA is not intensively monitored. Permits are not required for private use; organized groups are requested to register, and commercial use requires a permit. A management presence has been almost nonexistent, so the degree of compliance with these procedures is unknown. Private visitor use is compiled from a trailhead register at the Sundance Trail and from registration forms completed by visitors at the resource area office. Patrol observations indicate that actual private use (see table 4333-5) is probably twice the 2,135 user days recorded in 1984.

Other than the Sundance Trail, the major entrance points for the Dark Canyon drainage are located on USFS lands where there are no trailhead registers.

TABLE 4333-5

Dark Canyon Primitive Area Recorded Visitation
(User Days)

	1982	1983	1984
Private[a]	1,606	1,970	2,135
Organized Groups (noncommercial)	186	204	294
Commercial	610	357	301
Total	2,402	2,531	2,730

[a] The private use figures are based mainly on trailhead registrations. Studies on these types of stations have shown between 35 percent (Lucas, Schreuder, James, 1971) and 72 percent (Lucas, 1975) of visitors do not register. Patrol observations also indicated a substantial number of visitors do not register. Based on this, it is realistic to assume actual private visitation is at least twice the recorded visitation.

It is not uncommon for users to hike into the PA from the National Forest. Recorded organized use amounted to 294 user days in 1984, and commercial use was 301 user days.

From inquires received by resource area personnel, use of the area is increasing rapidly and appears to occur mainly in April, May and June. Use peaks again in the fall, but is much less than the spring use.

There are no visitor registers for the Bowdie Canyon, Gypsum Canyon or Fable Valley systems; the amount of visitation is therefore unknown.

Other than the visitor register at Sundance there are no management facilities for the Dark Canyon PA. Responding to visitor inquiries and issuing commercial permits requires about 1.5 work months per year. Picking up the trailhead registration forms and canyon patrols account for an additional work month.

Use conflicts in the primitive area are limited. Motorcycle tracks were observed on both patrol trips in 1984, extending about 1 mile below the USFS boundary in Dark Canyon and also in Fable Valley. A petroglyph panel in Dark Canyon has been vandalized (date unknown), and surface collection at archaeological sites has been noted during patrol trips.

Facilities

The major campsites are located at the mouths of Sundance, Lean-To, Lost and Youngs Canyons and all show signs of substantial use. Loss of vegetation and large fire pits are evident at these sites, and erosion has exposed tree roots at Lost Canyon and Youngs Canyon campsites.

The remote, rugged nature of the PA makes safety a primary concern. With Dark Canyon becoming better known, less experienced hikers may be attracted to the area, increasing the probability of accidents. It could easily take a day to hike out to obtain help and another day to get back to an injured hiker.

Planning Guidance

A management plan for the PA has not been developed. The SRMA is covered by the Indian Creek-Beef Basin MFP, which directs that the area be managed for its primitive and scenic values.

San Juan Extensive RMA

The remainder of the SJRA (about 1,323,150 acres) is within the San Juan Extensive RMA. As a general rule, recreation use is not intensively monitored or managed in extensive RMAs.

The San Juan Extensive RMA provides settings in five of the ROS classes (see table 4333-1). There are approximately 90,000 acres of P setting distributed around the resource area. Locations include Mancos Mesa, Lower Indian Creek, Butler Wash, Castle Creek, Cross Canyon, and Bridger Jack Mesa. SPM (approximately 284,000 acres) and SPNM (approximately 293,000 acres) settings occur throughout the extensive RMA with the exception of the area east of Comb Ridge to the state line, which is mostly RN (approximately 640,000 acres).

Use and Management

Other portions of the resource area are not used substantially for recreation purposes. Estimated 1984 recreational use in the San Juan Extensive RMA is shown, by activity, in table 4333-6. Dispersed recreation such as ORV use, hiking, snowmobiling, cross-country skiing, hunting, and trapping uses do occur, but the amount and season of use are unknown. Conflicts with other recreationists or other resource uses are not evident.

Hunting in the SJRA occurs mainly in the RN and SPM settings on the mesas adjacent to Hart Draw, Alkali Canyon, and Montezuma Creek. Some hunting, mainly for bighorn sheep, occurs in the SPNM setting of the Beef Basin vicinity (cross-reference: Wildlife, Part I and Wildlife Habitat Management, Part II).

Some portions of the San Juan Extensive RMA currently experience heavy recreational use and have the potential to become recreation-intensive SRMAs. These include Beef Basin, Indian Creek, the Hole-in-the-Rock Trail, and Montezuma Creek. These areas and their uses, facilities, and current planning guidance are discussed separately.

Beef Basin. Beef Basin is a remote area (about 100,000 acres) of large, open sagebrush parks surrounded by sandstone ridges and buttes within a pinyon-juniper forest. There are numerous cliff dwellings, towers, and surface dwellings from the Anasazi culture (cross-reference: Natural History/ Cultural Resource Management, Part II). Both the cultural resources and the scenery are outstanding (also refer to the section on Visual Resource Management in this chapter). The special feature of Beef Basin is that most of these scenic and archaeololgical opportunities are available in an RN or SPM setting. The area is adjacent to CNP; private and commercial scenic tours travel to and from the park by way of Beef Basin and Indian Creek. The area provides opportunities for hunting of deer, as well as trapping of mountain lion, bobcat and coyote. Beef Basin roads also provide the motorized access to the Fable Valley/Gypsum portion of the Dark Canyon PA and the Butler Wash WSA.

The open nature of Beef Basin allows motorized travel into most of the area, and multiple routes are developing. The rugged conditions on existing routes also contribute to the multiple routes. This reduces the scenic values and leaves the visitor confused as to which route to take.

Use of the area occurs mostly in May and June, declining in summer and fall. Both motorized and nonmotorized use appear to be on the increase; however, neither type of use is sufficient to cause substantial conflicts.

TABLE 4333-6

1984 Estimated Use in the San Juan Extensive RMA (in User Days)

Boating	100
Backcountry use (nonmotorized)	4,000
Off-road vehicle	2,000
Hunting	15,000
Fishing	300
Sightseeing	20,000
Total	41,400

NOTE: The demand for nonmotorized and motorized use in the San Juan Extensive RMA does not appear to be exceeding supply. There are areas, such as along Indian Creek, where the uses overlap and occasional conflicts result. The demand for campsites accessible by motor vehicle appears to be at capacity during spring weekends.

Indian Creek. The Indian Creek drainage (about 80,000 acres) varies from a narrow to open canyon with slickrock walls over 1,000 feet high. Numerous petroglyphs line the canyon walls (cross-reference: Natural History/ Cultural Resource Management, Part II). The stream flows year-round (a rarity in the Canyonlands) and supports numerous stands of cottonwood which make excellent camping locations. Indian Creek is also the only trout stream in San Juan County. State Highway 211 (a paved road) bisects this area and is the major access point for the Needles District of CNP. The area is visible from the overlooks of Canyon Rims Recreation Area (managed by Grand Resource Area, BLM). Bridger Jack Mesa and Indian Creek WSAs are located within this area (cross-reference: Wilderness Management, Part II). Newspaper Rock State Park, also within this area, provides developed camp and picnic locations and an interpretive self-guided trail.

BLM currently performs no recreation management and has no stated recreation objectives for this area. The main highway (U-211) through the area is traveled yearly by more than 40,000 visitors to CNP each year. Davis, Lavender, and Salt Creeks (all tributaries to Indian Creek) are used as hiking and ORV routes into the park.

Hole-in-the-Rock Trail. The Hole-in-the-Rock Trail is the most significant historical feature in the SJRA. It is listed on the National Register of Historic Places (cross-reference: Natural History/Cultural Resource Management, Part II). This route was established by the Mormon pioneers traveling from Escalante to Bluff, Utah to settle southern Utah in 1879. It traverses a wide variety of terrain, much of which is highly scenic and primitive, ranging from brush flats to rugged, steep slickrock (refer to the Visual Resource Management section in this chapter). The Hole-in-the-Rock Trail provides a unique opportunity for visitors to relive a portion of the history of the area in a setting ranging from SPM to RN.

The major use of the trail is by four-wheel drive vehicles and dirt bikes, for both the historical significance and the riding activity. The amount, trend, and season of use are unknown. There are no apparent conflicts among recreationists on the trail.

Montezuma Creek. The upper Montezuma Creek area (see Recreation Management Areas and Facilities overlay) also has potential as an SRMA. A passenger car accessible loop drive is available utilizing the Montezuma Creek (County Road 146) and Perkins Ranch (County Road 206) roads. This loop route is approximately 56 miles long and accessible from U.S. Highway 191, either 6 miles south of Monticello or 3 miles south of Blanding. The loop provides recreationists with undeveloped camping, hiking, and archaeological viewing in a highly scenic roaded natural setting. Existing points of interest include Three Kiva Pueblo, Bradford Canyon Ruins, and Pearson Canyon.

Facilities

Beef Basin. Recreation management facilities are limited to a single visitor register box and several signs. BLM and San Juan County are responsible to maintain the roads in Beef Basin, which are used for range and wildlife management, as well as by recreationists. Less than 1 work month is expended on these facilities each year.

Indian Creek. Several locations along Indian Creek are used as overflow camping grounds when developed campsites in CNP are full. The falls on Indian Creek are known as a popular spot for camping, ORV hill climbing, and swimming (a special activity in this desert region); these activities sometimes conflict with one another. April and May are the major use periods.

Hole-in-the-Rock-Trail. Signing has been done at most major locations; however, portions of the trail are unmarked and difficult to follow, causing some problems for the recreationist. Due to the remote location of the trail and lack of funding for its maintenance, signing is difficult to maintain. Other resource users occasionally propose to upgrade portions of the trail for access to their use areas.

Montezuma Creek. The Three Kiva Pueblo is a semideveloped recreation site in Montezuma Creek. It is a ruin of the Anasazi culture which contains 14 rooms and three kivas. It was inhabited, abandoned, and reoccupied at least three times during the Pueblo I though III periods. The ruin was excavated by BYU from 1969 to 1972. It was then stabilized, and Kiva I was restored. A cattle exclosure and visitor register completed the work on this site. No objectives for management of this site have been identified; management is limited to infrequent collection of visitor registrations. No conflicts among recreationists or between recreation and other resource uses have been identified for this site.

Bradford Canyon Ruins is a cliff dwelling of about 20 rooms which was stabilized the same time as Three Kiva Pueblo. A chain-link fence encloses the site and is the only managment facility. Where Bradford Canyon joins Montezuma Creek, a large group of cottonwoods provide a potential developed or undeveloped camping location.

Pearson Canyon also has potential for a camping location, as well as for hiking. The canyon has a primitive trail system already in place and retains a natural appearance. Grazing use has now been excluded from this canyon under agreement with the grazing permittee.

Montezuma Creek contains a wealth of archaeological resources on both private (including Nancy Patterson Village) and public lands which would increase the attractiveness of this potential SRMA (cross-reference: Natural History/ Cultural Resource Management, Part II).

Planning Guidance

Beef Basin. The area is currently managed under the Indian Creek-Beef Basin MFP. The plan recommends protection of scenic and archaeological values, through withdrawals from mineral entry and no surface occupancy on mineral leases on identified cultural sites; limiting ORV use to existing roads and trails except during hunting season and for project construction; providing site interpretation; providing camping facilities; preparing a recreation plan; and consideration of the area now covered by the Butler Wash WSA as a PA.

Indian Creek. The area is currently managed under the Indian Creek-Dry Valley MFP. The plan recommends providing interpretive information at Lavender Canyon and Hart Draw; interagency cooperation to construct a road from Mountain Lake (near Monticello) to Indian Creek; evaluating lower Indian Creek, Hart Draw, and Hatch Creek for primitive recreation values; and leaving the area open to ORV use except along Indian Creek where use would be limited to designated routes.

Hole-in-the-Rock Trail. The land use plan currently in effect is the South San Juan MFP, completed in 1973. Its objectives for management of the trail include protection of the physical evidence and natural environment and provision of signs to identify all points of interest.

Montezuma Creek. The area is managed under the Montezuma MFP, which is silent on specific objectives for recreation management.

Outside of these areas, planning guidance in the Indian Creek-Dry Valley, Indian Creek-Beef Basin, and South San Juan MFPs addresses several management objectives for recreation. Proposals still pending include designating Bridger Jack and Lavender Mesas as RNAs and closing them to ORV use; limiting ORV use in Lockhart Basin to designated routes; studying Mancos Mesa, Wingate Mesa, White Canyon, and lower Castle Canyon for PA designation and closing these areas to ORV use; providing information on rockhounding in lower Lisbon Valley and the South San Juan planning unit; and providing signs to interpret historic, prehistoric, and wildlife resources. Except as noted, planning recommendations are to leave the remainder of the SJRA open for ORV use; however, the Montezuma MFP is silent on recreation use, including ORV designations.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area for recreation resource management. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County. For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

The recreation related purchases of goods and services have spinoff income, employment, population, and fiscal effects.

Table 4333-7 presents visitor use statistics by region and activity.

San Juan County receives significant resident and nonresident use, and the SJRA accounts for much of this use. Approximately 50 percent of the tourists traveling through the county actually visit attractions within the county.

TABLE 4333-7

Estimated Number of Annual Recreation Visits
(1979-1981)

Region	Resident In Community	Resident Out Community	Non-Resident	Total
Southeastern District	967,800	944,400	1,623,700	3,535,900
Canyonlands Region	366,457	926,420	1,592,790	2,885,667
San Juan County	219,098	296,454	509,693	1,025,245
SJRA[a]				40,000-75,000

Southeastern District: Carbon, Emery, Grand and San Juan Counties

Canyonlands Region: Grand and San Juan Counties

[a] Accounts for visits to attractions within the SJRA. Does not account for incidental recreation visits in transit to attractions outside of the SJRA. Nearly all of the county's recreation visitation must pass through the SJRA in transit.

Source: Dalton, 1982; IORT, 1984; BLM Records.

Between 7 and 20 percent of those who visit attractions in the county visit attractions in the SJRA. However, nearly all tourists traveling through the county pass through the SJRA. Table 4333-8 indicates that the activities accounting for most of the resident use include driving for pleasure, camping, four-wheeling, picnicking, hiking-backpacking, and hunting. Table 4333-9 indicates that the activities accounting for most of the nonresident use include viewing scenery, hiking-backpacking, camping, picnicking, photography, and boating.

Unlike other industrial sectors, the local importance of tourism cannot be determined through commonly available sales, income, and employment statistics. Most of the same businesses that cater to tourists also cater to local residents for nonrecreation related expenditures.

Several IORT and BEBR studies have examined recreation related expenditures by both residents and nonresidents in southeastern Utah and the Canyonlands region (IORT, 1984; Dalton, 1982; BEBR, 1962).

Statistics for San Juan County have been inferred based on the Canyonlands Region statistics and studies generated during the Grand Resource Area MSA (BLM, 1982).

Average annual recreation related expenditures by region are presented in tables 4333-10. Table 4333-11 presents the distribution of these expenditures.

As expected, the hotel-motel industry is most dependent on tourism. Recreation outfitters' sales, which are included in the service sector, are almost entirely dependent upon tourism. Restaurants are also highly dependent upon tourism, and generally are more vulnerable to changes in tourist trade than are grocery stores. General merchandise stores, gas stations, and auto repair businesses also depend on tourism for a significant portion of their sales.

Local income and employment estimates due directly to recreation travel within the county are given in table 4333-12. Recreation in the SJRA accounts for 4 to 8 percent of this total. (See the Economic Methodology section in Part III for a description of the methodologies and economic models used.)

Altogether, 323 of the jobs (9 percent of county employment), and $4,423,888 of the personal income earned in San Juan County (7 percent of county income) can be attributed to recreation in San Juan County. These figures include visitors with destinations both within and outside the county. Attractions within the county account for only a portion of the total local tourist industry, as only half of those traveling through the county visit any local attractions. Visits to attractions within the SJRA account for 12.6 to 23.1 of the jobs (0.3 to 0.5 percent of county employment), and $172,647 to $317,563 of the personal income earned in the county (0.3 to 0.5 percent of county income) (see table 4333-12).

TABLE 4333-8

Outdoor Recreation Participation by Residents in San Juan County (1977)

Activity	Activity Occasions
Driving	140,000
Camping	105,000
Four wheeling	80,000
Swimming[a]	70,000
Picnic	45,000
Hiking Backpacking	40,000
Hunting	40,000
Spectator Sports[a]	30,000
Motorcycling	25,000
Horseback	25,000
Power boating[a]	20,000
River Running	15,000
Fishing[a]	15,000
Four-wheeling	10,000
Other	60,000
Total	640,000

[a] Few of these activity occasions occur on public lands.

Source: IORT, 1978.

TABLE 4333-9

Nonresident Ranked Order of Participation in the Canyonland Region, 1980-1981

Activity	Rank
Viewing Scenery, Visiting Attractions	1
Hiking, Backpacking	2
Camping	3
Picnicking	4
Photography	5
Boating	6
Rockhounding	7
Fishing	8
Swimming	9

Source: IORT, 84.

TABLE 4333-10

Average Annual Recreation Related Expenditures, 1976-1982
(in 1980 first quarter dollars)

Region	Resident In Community	Resident Out Community	Non-Resident	Total
Southeastern District	1,641,000	15,217,000	22,197,000	39,055,000
Canyonlands Region	619,000	8,753,000	12,768,000	22,141,000
San Juan County	370,276	2,801,490	4.174,584	7,256,685
SJRA[a]				283,200-520,911

[a] Expenditures made within San Juan County due to recreation on public lands within the SJRA.

Source: IORT, 1984; IORT, 1978; Dalton, 1982.

Table 4333-11

Distribution of Recreation Expenditures by Standard Industrial Code Sectors (in 1980 first quarter dollars)

		San Juan County		SJRA	
SIC Numbers	Sector Name	Recreation Expenditures	% of Total Sector Sales	Recreation Expenditures	% of Total Sector Sales
4	Transportation & utilities	$ 296,208	25[a]	$ 16,411	1.4
54	Food stores	592,416	40	32,823	2.2
55	Auto dealers & gas stations	1,692,618	50	93,779	2.8
58	Eating & drinking establishments	1,523,357	95[a]	84,401	5.3
70	Hotels & motels	1,227,148	100[b]	67,990	5.5
	Other retail & services	1,819,566	5	100,813	0.3
Totals		$7,151,313	18	$396,217	1.0

[a] Eating and drinking sales figures seem high. The proportion of tourists eating at restaurants versus purchasing food at food stores may be lower in San Juan than for the state as a whole.

[b] Hotel and motel sales figures are apparently overestimates, assuming that the hotel-motel industry is entirely dependent on tourist and business travelers; tourism actually accounts for only 80 percent of that sector's sales. This overestimate is probably due to a lower proportion of visitors staying in hotels in San Juan County than is true for the Canyonlands Region.

Source: IORT, 1984; IORT, 1978; Dalton, 1982; BEBR, 1962.

TABLE 4333-12

Total Local Income and Employment Generated By Recreation Travel in San Juan County (in 1982 first quarter dollars)

	Direct Indirect & Induced Effect					
	San Juan County			SJRA		
Industrial Sector	Earnings[b] (dollars)	Employment (jobs)	% of Total	Earnings (dollars)	Employment (jobs)	% of Total
Farm	13,234	1	1	735	0.1	0.1
Private						
Mining						
Construction						
Manufacturing	142,160	10	8	7,905	0.6	0.4
Transportation & Utilities	342,520	20	10	19,047	1.1	0.6
Wholesale	393,262	19	20-25	21,868	1.1	1.1-1.4
Retail	1,187,615	121	39	66,040	6.7	2.2
F.I.R.E.[a]	36,466	2	5-10	2,028	0.1	0.3-0.6
Services	1,518,000	120	30	84,104	6.7	1.7
Government[c]	66,550	5	1	3,701	0.3	0.1
Proprietor's[b]		26	5		1.4	0.3
Total	3,699,807	323	9	205,000	18.1	0.5
Total Personal Income[b]	4,439,768					

[a] Finance, insurance, and real estate

[b] Earnings include wage, salary, and proprietor's income; personal income also includes dividends, interest, and rents, plus transfer payments and residential adjustments. Proprietor employment is not broken out by sector.

[c] Government sector figures account only for government enterprises such as the Post Office, and do not account for public administration.

Sources: USFS, 1982; BEA, 1984a; BEA, 1984b.

Tourism ranks as the third largest employer and second largest income generating industry in the county. The industry forms a fairly stable economic base, which has been growing with regional population growth and may increase in importance as the other industries, such as mining, decline. The industry does experience annual fluctuations and is highly susceptible to economic recessions. However, these fluctuations are not of the size or duration of mining booms and busts. A larger proportion of temporary jobs with relatively low salary levels are associated with the recreation industry, particularly with the businesses most dependent upon tourism.

Some of the governmental cost related to managing recreation within the SJRA also contributes to local sales, and therefore to local income and employment. The resulting income and employment effects are summarized in table 4333-13. These effects account for less than 0.1 percent of local employment and income and are locally insignificant.

In addition to the income and employment effects, recreation within San Juan County affects both revenues and costs of several local taxing jurisdictions. Recreation related sales, property, and transient room taxes brought an estimated $160,000 to local taxing jurisdictions (see table 4333-14). Recreation in the SJRA brings an estimated $6,000 to $11,000 to local taxing jurisdictions. These figures are thought to be conservative since they do not include other related revenue sources.

CONSISTENCY WITH NON-BUREAU PLANS

The Glen Canyon General Management Plan (November 1979) proposed wilderness designation of NPS lands in the San Juan River corridor from their eastern boundary to a mile below Grand Gulch. This could impact use limits and types of recreation facilities allowed in this proposed wilderness. Wilderness designation is also proposed for NPS lands adjacent to Wilson Mesa, Mancos Mesa WSA, and the Dark Canyon PA; these should not significantly alter recreation management of the adjacent BLM lands.

The Canyonlands General Management Plan (May, 1978) also contains wilderness proposals for the majority of lands on their eastern and southern boundaries. The Indian Creek WSA, Butler Wash WSA, and Dark Canyon PA are adjacent to these proposals (cross-reference: Wilderness Management, Part II). This plan also calls for motorized corridors in Davis and Lavender Canyons, Devils Lane, and Squaw Flat. These proposals would not be in conflict with BLM recreation management.

San Juan County has a master plan (September, 1968) which addresses land uses. Most BLM recreation use lands are classified as open range/forest lands, which would be consistent with recreation uses, but a large block of land within the Grand Gulch Plateau SRMA is classified as possible future agricultural land. This would be in conflict with recreation objectives outlined in the interim management plan for Grand Gulch Plateau (August 1981). This would also be the case with a portion of land on Dark Canyon Plateau which overlaps the Dark Canyon PA. The remaining parts of the county plan are in harmony with recreation management in the SJRA.

TABLE 4333-13

Local Importance of SJRA Recreation Program Related Costs (FY 1984, 1982 first quarter dollars)

SIC Sector	Estimated Cost of the Recreation Program	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	145,000	$ 55,902	4.2
Other Sectors[a]		$ 30,246	1.7
Total		$ 86,148	5.9

[a] Includes the direct, indirect, and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

Source: BLM Records; USFS, 1982.

TABLE 4333-14

Recreation Related Taxing District Revenues
(Calendar Year 1984 and Fiscal Year 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues due to Recreation in	
					San Juan County	SJRA
Taxes	$3,543,909	$582,906	$7,530,196	$11,657,011	$160,000	$8,500
Licenses and Permits	2,853	10,714		13,567		
Intergovernment	2,595,259	924,897	6,847,000	10,367,156		
Charges for services	227,039	82,810	148,000	457,849		
Fines and forfeitures	131,661	56,626		188,287		
Miscellaneous	970,241	285,855	447,820	1,703,916		
Totals	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$160,000	$8,500

NOTE: Only taxes directly associated with the activity were assessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue sources are expected to be minor, these effects were not quantified.

[a] Activity related costs could be neither delineated nor quantified.

[b] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Yoakum, 1985; Smuin, Rich, and Marsing, 1984; Monticello, 1984; Utah Tax Commission, 1985; and Utah Foundation, 1985.

The State of Utah has the Utah Outdoor Recreation Plan of 1980, which shows 1980 outdoor recreation use and projected increases. Providing for the use increase by activities outlined in this MSA would be consistent with this plan.

DATA GAPS

Actual recreational use of most of the SJRA is unknown. Additional data could be collected through visitor surveys. The highest priority should be given to the following.

1. ORV activity survey, which would require 3 work months (March 15 to June 15) for field inventory and survey, 1 work month for mapping and analysis.
2. San Juan River user preference study, which would require 3 work months (April 10 to July 10) for interviewing river runners, 1 work month for analysis.
3. Grand Gulch/Dark Canyon user preference study, which would require 4 work months (March 15 to June 1) for survey, 1 work month for analysis.
4. San Juan River carrying capacity survey, which would require 1 work month for campsite inventory and 1 work month for analysis.
5. Grand Gulch capacity survey, which would require 2 work months for campsite inventory and movement pattern inventory, and 1 work month for analysis.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

San Juan River SRMA

Recreation use permits are required for both private and commercial use on the San Juan River, in order to limit use to levels acceptable for resource protection and social setting. There were 600 private permits issued in 1983 and 794 in 1984. Fees are charged for all commercial use and for private use between May 1 and September 30. In 1983 fees collected amounted to $15,920 for private use and $3,321 for commercial. While use increased, the fees collected in 1984 declined to $10,243 for private use and $2,700 for commercial use. This decrease was due to the reduction in user fee rates as set forth in the Special Recreation Permit Policy (February 10, 1984). Administration of the permit process and fee collection requires about 5 work months per year.

Visitor use on the San Juan has increased dramatically over the past several years as shown in table 4333-2.

Based on an average of the past 5 years (1980 to 1984), private use amounts to 82 percent, private (organized groups) 7 percent, and commercial 11 percent.

Each day 75 people (combined commercial and private use) are allowed to launch at Sand Island, and 75 at Mexican Hat. There are no use limits at Montezuma Creek, but users must reserve space at Sand Island to continue past this point. Sand Island is the most popular launch point (see table 4333-3), with 77 percent of the trips and 64 percent of the users putting in there.

Last year (in 1984) the use limit at Sand Island was reached on 9 days in April, 27 days in May, and 27 days in June. In other months there were 13 days on which use limits were reached. When applications were received for already filled dates, a letter was sent asking for consideration of alternative launch dates. Many boaters were able to reserve launches in this fashion; however, 44 applications could not be accommodated. Additional demand for Sand Island launches is evident.

Use limits at Mexican Hat were reached on only 9 days. The demand for Mexican Hat launches has not yet exceeded supply. The extended trip length, limited cultural resources, and undeveloped nature of the launch area may account for some of the lack of interest in launching at this point.

While it appears that capability exists to meet additional demand for trips from Mexican Hat to Clay Hills Crossing (based on available launches), this may not be the case. A shortage of campsites limits use in this portion of the canyon. From Johns Canyon to Clay Hills Crossing (25 miles) the number of campsites is limited, and few sites will support groups of eight or more.

Should all groups launching at Sand Island take out at Clay Hills Crossing (and most do), and should the Mexican Hat launches be filled, a semiprimitive setting may not be possible because of the social setting. No campsite inventory or carrying capacity studies have been conducted for the San Juan River.

The Montezuma Creek to Sand Island section does offer additional day or overnight boating opportunities. The physical setting of this portion (i.e., no rapids, reduced scenic quality, and increased signs of human use) make it unlikely that this section will be a good substitute for the lower sections.

Grand Gulch Plateau SRMA

Recreation use permits are not required for private use within the SRMA, although an estimated 80 percent complete a visitor registration form either at the SJRA office or at Kane Gulch Ranger Station or sign visitor registers within the SRMA. Four commercial permits were issued within the SRMA in 1983, and six in 1984. Visitation in all categories was shown in table 4333-4 for major canyons and day use sites within the Grand Gulch Plateau SRMA.

No visitation data are available for Johns Canyon, Lime Creek, upper and lower Mule Canyon, Road Canyon, McLloyds Canyon, Comb Wash, Butler Wash, nor other major and minor canyon systems with the SRMA.

In 1984 six commercial permittees were authorized in the Grand Gulch PA, and a moratorium on additional commercial permits within the PA was imposed. Approximately three additional requests for commercial permits were received in 1984. All have been issued in areas outside the PA.

The number and size of private organized groups (i.e. schools, clubs, and scouting groups) limit primitive and semiprimitive opportunities in the SRMA. These groups often have 20 to 25 people. Observations indicate that most campsites in these areas would not support this size group. Also, the impact on a user of meeting a group of 25 persons (as opposed to meeting a smaller group) was not in line with the primitive or semiprimitive setting. For 1985, group size limits were adjusted. Group size for the Grand Gulch PA and Slickhorn, Road, Lime, Fish, and Owl Canyons was restricted to 15 individuals; pack stock parties were restricted to 12 animals. Organized groups are also required to obtain a permit and a reservation, in order that use can be more evenly distributed.

In 1985, limitations on the allowable number of horse and pack stock parties have been raised, from one party to no more than three stock parties, totaling 25 animals, allowed in the Grand Gulch PA or Fish and Owl Creeks at any one time. This permitted a more equitable and realistic solution to demands for this type of recreation.

There are currently no limitations on the number of private user groups within the SRMA, often resulting in complaints of overcrowding, especially during peak use seasons. Although visitors have not been surveyed regarding number of contacts, it is believed that on some weekends during April and May the hiking route from Kane Gulch Trailhead to Bullet Canyon Trailhead may not be providing a primitive social setting due to the number of interparty contacts. Use in the Fish and Owl Loop Trail and Slickhorn Canyon is also increasing during these periods, and may not be providing a primitive social setting. Other canyon systems within the SRMA are not substantially used, and use could increase in these areas without impacting the users' experiences. Directing use to these areas may result in possible unmonitored impacts on resources within these areas.

Dark Canyon SRMA

Recreation use permits are not required for private use in Dark Canyon. Some private users do stop by the office to register for safety purposes or sign the visitor register at the Sundance Trail. Four commercial permits were issued in 1983 and 1984 which included the Dark Canyon PA as part of their permit. These were issued to the Sierra Club, Horsehead Pack Trips, Colorado Outward Bound, and National Outdoor Leadership School. Recorded visitation was shown in table 4333-5.

Almost all (an estimated 95 percent) of this use occurs in Dark Canyon itself. On weekends during April, May, and June, all major campsites are used nightly. This presents some crowding as campsites at Sundance and Lean-To are within 100 yards of each other, and Lost Canyon campsite is less than a mile away. At other times of the year, the frequency of group contacts does not detract from the primitive experience. The other canyons in the PA are not substantially used, and use could increase without adversely impacting the primitive experience.

San Juan Extensive RMA

Recreation use permits are required for commercial use in the San Juan Extensive RMA. Three commercial permittees operate in these portions. The National Outdoor Leadership School and Colorado Outward Bound make use of Indian Creek and Beef Basin as part of their course offerings. Tag-A-Long Tours uses Beef Basin as part of their vehicle tours through Canyonlands National Park. Use by these operators amounted to about 1,800 user days in 1984. This amount is representative of their use over the past several years.

Permits are not required for private use in the San Juan Extensive RMA, and no visitor use statistics are available.

The major uses in this area appear to be hiking, ORV use, and associated camping. Almost all the potential campsites along Indian Creek are used on weekends during April and May. A lot of this use appears to be generated from visitors to CNP. Rangers from the Needles District indicated that a substantial number of persons seeking non-back-country camping are turned away each spring due to lack of campsites within the park. The campsites at Newspaper Rock State Park are also regularly filled during this period. The major uses adjacent to Highway U-211 (down to Dugout Ranch) appear to be camping and hiking with associated ORV use.

The major recreational ORV use area in the SJRA occurs in the Indian Creek vicinity. The Davis Canyon, Lavender Canyon, Hart Draw, Lockhart Basin, and lands north of U-211 to Indian Creek are used significantly by ORVs.

Estimated use in the San Juan Extensive Recreation Management Area for 1984 was shown in table 4333-6.

The Indian Creek area, as discussed above, has about reached its capacity for undeveloped campsites accessible by motor vehicles during April and May. ORV activity in this area appears to be approaching capacity at this time.

The uses that occur in the remainder of the San Juan Extensive RMA do not appear to be at or close to capacity.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

Future demand for recreation resources in the SJRA will be determined by:

(1) site characteristics and public awareness of these sites;

(2) availability of substitute sites and public awareness of these sites;

(3) population distribution about the site;

(4) the population's tastes and preferences; and

(5) the population's income and leisure time.

A study by Hof and Kaiser (1981) accounted for factors 2, 3, 4, and 5 in the Rocky Mountain region and predicted changes in future use by activity type (see table 4333-15). These projections should be applicable to the SJRA. Those factors that had a major influence on participation and activity preferences were regional growth in population and income, and the projected increase in the population's median age. It is clear from the results presented in table 4333-15 that substantial increases in participation are expected for all activities. For those activities taking place in the SJRA, participation is expected to increase by 20 to 30 percent between 1985 and 2000.

Hof and Kaiser also found that use projections were sensitive to the availability of recreation resources. Use projections for those activities that require scarce, specialized facilities, such as developed campsites, were highly sensitive to available supply. The availability of facilities had little affect on recreation use projections for activities such as sightseeing and four-wheeling, which are not constrained by scarce opportunities for participation. Their results indicate that BLM management actions can have a significant impact on visitor use. Changes in user fee charges were not factored into the use projections. Through user fee charges, BLM can affect recreation use and activity preferences.

Demand is projected to increase significantly for all the above recreation activity types. Correlation of these increases with the ability of the public lands to support these increases is not directly possible without carrying capacity studies. Some general conclusions can be made about future demand and the capability to meet it.

San Juan River SRMA

With use limits already being reached at Sand Island during most days in May and June, additional use will most likely fill up Sand Island launch dates in April and July and push additional use to the Mexican Hat launch point. This has several probable ramifications: boaters seeking a day or overnight trip will find it harder to get a launch date (this length trip is not available from Mexican Hat) and campsites along the river will be utilized more frequently and for a longer season. Should the majority of boaters take trips that extend below Mexican Hat, the social setting may cause a change in ROS setting from SPM to RN.

The currently underutilized Montezuma Creek to Sand Island section of river might provide additional day and overnight boating opportunities. The major drawbacks to its use appear to be the lack of rapids, lack of desirable campsites, and its RN setting. Due to these factors, it is not believed that

TABLE 4333-15

Indexed Recreation Use Projections for the Rocky Mountain Region with Static and Increasing Resource Supply

Type of Activity	1985	2000
All land based	100	124
Camping (developed)	100	131
Camping (dispersed)	100	128
Nature study	100	125
Hiking	100	121
Horseback riding	100	121
4-WD	100	124
Picnicking	100	125
Sightseeing	100	125
Pleasure walking	100	122
Driving for pleasure	100	123
All flat water and stream based	100	127
Canoeing	100	130
Sailing	100	152
Water skiing	100	116
Other boating	100	127
Swimming outdoors	100	121
Snow and ice based	100	140
Downhill skiing	100	143
Snowmobiling	100	108
Cross-country skiing	100	147
Ice skating	100	172
Sledding	100	159

Source: Hof and Kaiser, 1983a; Hof and Kaiser 1983b; USFS, 1981.

this section of the river will adequately provide for the day and overnight trips in an SPM setting that the Sand Island to Mexican Hat section now provides.

With use increases on the San Juan River, additional work months will be needed to administer the permitting process, conduct compliance checks, and monitor the river condition. With launch dates becoming more difficult to obtain, more boaters will attempt to get on the river without permits (likely without the necessary resource protection and safety equipment), requiring more compliance work to maintain the physical and social setting on the river. An estimated 12 additional work months (2 administrative and 10 compliance) would be necessary to maintain the recreation resource.

Grand Gulch Plateau and Dark Canyon SRMAs

Backcountry activities (nonmotorized) including hiking, camping, and pack stock use are also expected to increase substantially in the SJRA. The Grand Gulch PA, particularly the Kane Gulch/Bullet Canyon loop, may not maintain its P ROS setting due to the increased number of intergroup contacts by the year 2000. Other P settings such as Dark Canyon, Slickhorn Canyon, and Fish and Owl Creek Canyons will also have a substantial increase in use, possibly changing the setting from P to SPNM. Users looking for that P setting will be displaced to other similiar settings such as Road and Lime Canyons, Mancos Mesa, Butler Wash, and Bowdie and Gypsum Canyons. Some users will find their desired experience is possible in an SPNM setting and will go to areas that are essentially natural in character, but lack the size or remoteness to classify them as P settings. Areas that most likely will receive this type of use include White, Cheesebox, and Mule Canyons.

The P setting contains the least amount of acreage of the four major setting types in the resource area and appears to be the most in demand. In order to continue to provide this setting, management actions will be needed to maintain the unmodified natural environment. The primitive social setting will also have to be maintained. Grand Gulch PA will require a system, either permit or voluntary, to limit use. Dark Canyon, Slickhorn Canyon, and Fish and Owl Creek Canyons will most likely also require some management actions to limit use.

The increased use will bring an increased workload in the SJRA. Responding to inquires, permitting (if deemed necessary), and field patrol would require an additional 14 to 20 work months.

San Juan Extensive RMA

ORV use is projected to have one of the highest percent increases of the activities listed. Current recreational ORV use is not as high as nonmotorized use in the resource area, so overall projected increased use is not as high as nonmotorized use. ORV use occurs in the SPM and RN settings, with areas adjacent to CNP (Beef Basin and Indian Creek, including Davis and Lavender Canyons, Lockhart Draw, and Lockhart Basin) being the most often utilized and subject to a major portion of the projected increases. Use is likely to be displaced from these areas into other suitable settings such as

Red Canyon, Arch Canyon, Butler Wash, Comb Wash, and the Hole-in-the-Rock Trail. Overall use levels are not expected to increase enough to cause a change, due to social setting, in the setting classes. The exception to this would be along the Lockhart Basin Road (County Road 122) between Highway U-211 and Indian Creek where intense ORV activity and associated camping are expected to increase.

While projected increases are not expected to change the SPM and RN settings, they may change some of the SPNM settings.

Users may develop overland vehicle routes into the edges of the SPNM settings, changing them to motorized settings. The lower Indian Creek and Comb Wash areas would be likely locations for this to occur.

A need for permits to maintain ORV opportunities is not anticipated, but management actions will probably be required in the Indian Creek and Beef Basin areas to monitor and maintain resource conditions and provide visitor assistance. This would require about 6 additional work months per year.

Hunting is expected to increase. Most of the projected increase in hunting use can be accommodated on the public lands. Beef Basin, which has had substantial historic deer hunting use, could be impacted. Deer herd unit 31B, which includes Beef Basin, was closed to hunting between 1981 and 1983; in 1984 a limited number of permits were available (cross-reference: Wildlife Habitat Management, Part II). Should this unit be opened to an unlimited hunt, Beef Basin could change from SPM to RN setting due to the social setting.

Additional hunting use could require an additional 2 work months to monitor and maintain resources and hunting opportunities. Hunting permits are regulated by the state and would not involve BLM time.

Sightseeing is expected to increase dramatically and will continue to occur mainly in the RN setting along U.S. Highways 163 and 191 and State Highways U-95, U-211, U-261, and U-263. These highways should be able to accommodate the projected increases without impacting the RN setting. If substantial modification of the landscape occurred, the scenic vistas that now provide much of the sightseeing use could be altered, reducing the area's scenic setting and adversely affecting sightseeing use.

Increases in other recreation activities are not expected to exceed the availability of appropriate settings.

CRITICAL THRESHOLDS

As previously discussed, the basis for recreation management is the ROS setting in which an activity can occur. The ROS setting is determined by factors that influence the physical, social, or managerial setting. The factors that determine ROS classes are shown in table 4333-16. An action that would significantly alter one of these three settings would cause the ROS class for that area to change.

TABLE 4333-16

ROS Setting Factors

	Primitive	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Rural	Modern Urban
Remoteness	At least 3 miles from from all roads or railroads	At least 0.5 mile from all roads or railroads	Within 0.5 mile of primitive roads and at least 0.5 mile from better than primitive roads	Within 0.5 mile of better than primitive roads	No distance criteria	No distance criteria
Size Criteria	5,000 acres*	2,500 acres**	2,500 acres**	No size criteria	No size criteria	No size criteria
Evidence of Human Use Criteria	Unmodified natural environment; surface disturbance rare and small; trails ok; no roads; structures small and rare.	Setting may have subtle modifications; surface disturbance limited and small; little or no evidence of primitive roads or motorized use, small isolated structures may be present.	Setting may have subtle modifications; surface disturbance limited and small, primitive roads and motorized use are present; small isolated structures may be present.	Moderate evidence of human modification harmonious with landscape; surface modification common; roads and highways present; structures scattered and visually subordinate; recreation facilities small and rustic.	Setting substantially modified; surface modifications typical; roads and highways present; cultivated lands common; structures readily apparent, small dominant clusters, developed recreation facilities.	Natural setting subordinate to culturally modified landscapes.

TABLE 4333-16 (Continued)
ROS Setting Factors

Social Setting Criteria	Fewer than 6 parties encountered on trail per day; fewer than 3 parties visible at campsite; little evidence of previous recreation use.	6-10 parties encountered on trail per day; fewer than 6 parties visible at campsite; limited evidence of previous recreation use.	Low to moderate contact frequency.	Frequency of contact is moderate in developed sites and on roads; low to moderate elsewhere.	Frequency of contact is moderate to high in developed sites and on roads and trails; moderate elsewhere.	Large numbers of users onsite and in nearby areas.
Managerial Setting Criteria	No onsite controls, only offsite; onsite facilities for resource protection only; no facilities for user convenience or safety.	Offsite controls preferred, onsite controls subtle; facilities are avoided but may be provided for resource protection or user safety.	Onsite controls present but subtle facilities for resource protection and user safety, law enforcement occasionally visible.	Onsite controls noticeable, but harmonious with natural environment; rustic facilities for user convenience and resource protection, law enforcement enforcement occasionally visible.	Onsite controls obvious and numerous; facilities widely available for user convenience, safety, special acitvities and resource protection; law enforcement moderately visible.	Onsite controls are numerous. Facilities for intensive use are provided. Law enforcement is highly visible.

*May be smaller if adjacent to semi-primitive nonmotorized class
**May be smaller if adjacent to primitive class

Two critical thresholds can be determined. The first is the level of management that would cause a specific site to change to a different ROS class, either more primitive or more developed. A change to a different class would be adverse to some recreational users and beneficial to others. The second threshold is the level at which the cumulative effect of management actions would cause 20 percent or more of the acreage within a given ROS class to change to a different class.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

The current management is adequate in some respects, but is often inadequate in managing certain areas.

ORV designations, required by 43 CFR 8340, have not been made. These should be made through the RMP, using the impact analysis to establish a rationale for designations made.

Across the resource area, one indication of management adequacy is the ability of the resource to maintain existing ROS classes. Although no management objectives have been developed to identify an optimal balance among classes, current management is not aimed at maintaining either existing or preferred ROS settings.

If crowding and heavy use continue at the current accelerating rate, there could be a loss of acreage in the P, SPNM, and SPM classes and an increase in the RN and R classes. A change is especially likely to occur in the San Juan River and Grand Gulch SRMAs, and in the Indian Creek area.

Recreation management for specific areas is generally considered adequate, except as noted for specific areas.

San Juan River SRMA

Funding levels have been inadequate (since 1982) to cover the seasonal ranger staff. Facilities appear to be inadequate at the Sand Island recreation site, resulting in crowding, vandalism, and littering. Facilities are lacking at the Mexican Hat and Clay Hills launch and takeout sites, resulting in vandalism, litter, and human waste problems. Heavy use by boaters, and possibly by other recreationists, has caused human waste problems, loss of vegetation, and damage to trees at Butler Wash, Comb Wash, Eight Foot Rapid, Honaker Trail, Johns Canyon, and Slickhorn Canyon. Planning guidance begun in 1979 was not completed.

Grand Gulch Plateau SRMA

Funding is insufficient to maintain a permanent ranger staff at the Kane Gulch ranger station. Ranger facilities are considered adequate. The facilities at Mule Canyon and Butler Wash Indian ruins are considered generally adequate, although toilet facilities are needed at the Butler Wash Indian ruin. Vandalism of archaeological sites is a continuing problem.

Heavy use of major undeveloped campsites within the PA and at the head of Arch Canyon have resulted in loss of vegetation and fuelwood. A management plan drafted in 1980 was not completed, pending completion of the RMP. An interim plan completed in 1981 has not been fully implemented due to budget and personnel shortages.

Dark Canyon SRMA

Some use conflicts, such as motorcycle tracks in the PA and vandalism of archaeological sites, have occurred. Major undeveloped campsites at Sundance, Lean-To, Lost, and Youngs Canyons show substantial use resulting in loss of vegetation. The current low level of management has apparently been adequate; however. No management plan has been developed for the SRMA.

San Juan Extensive RMA

The ORV designations required by 43 CFR 8340 have not been developed. The Beef Basin, Indian Creek, Hole-in-the-Rock Trail, and Montezuma Creek areas exhibit increasing recreational use. Multiple routes developing in Beef Basin have contributed to visitor confusion and reduction of scenic values. Some conflicts occur among recreation user groups in the Indian Creek area. The Hole-in-the-Rock Trail is in some places difficult to distinguish, and portions of the trail are occasionally upgraded for access for other resource uses.

Other than problems noted, recreational resource management in the extensive RMA appears to be adequate. This could change if use continues to increase.

MANAGEMENT OPPORTUNITIES

The RMP provides the opportunity to designate all areas within the SJRA as open, limited, or closed to ORV use. Designations would be based on resolution of resource use conflicts through the RMP/EIS.

To optimize the recreation potential, the SJRA could be managed to provide the settings for the range of activities currently occurring and for levels projected for the year 2000. The resource area could determine the amount of acreage that should be included in each setting, both to maintain current opportunities and to meet projected demands.

The settings toward the primitive end of the spectrum tend to be the most crucial in the SJRA because they contain the least acreage and are most in demand, and because many management actions tend to change the setting away from the primitive end of the spectrum. To provide settings for the projected use, the maximum amount of acreage could be maintained in the P, SPNM, and SPM settings. The RN setting could be maintained where significant recreation use is occurring, such as along major tourist routes. To maintain these settings would require that the critical threshold levels identified in table 4333-26 be met. Specific guidelines, by ROS classes, are given below for resource management actions that could be applied in order to maintain the settings.

Primitive Settings

Recreational activities occurring in this zone include: backpacking, hiking, camping, swimming, horseback riding, and nature study. Backcountry use levels and management of renewable resources depend on maintaining ecosystems comparable to those occurring naturally.

The frequency of managerial contact with users should be very low.

Specific P setting guidelines, which could be implemented in order to maintain this setting, include:

1. Designate this setting as closed to off-road travel.
2. Designate this setting as No Lease or No Surface Occupancy in the oil and gas leasing categories.
3. Allow no surface disturbance from seismic exploration.
4. Withdraw this setting from mineral entry.
5. Minimize grazing use in this setting.
6. Maintain this setting in public ownership.
7. Allow only native wildlife species in this setting.
8. Allow cultural resources to remain subject to natural forces.
9. Allow only recreational woodland products harvest.
10. Allow no project developments in this setting.
11. Allow fires to burn unless life or property is threatened; utilize nonmotorized suppression methods first.

Semiprimitive Nonmotorized Settings

Recreational activities occurring in this zone include backpacking, hiking, picnicking, viewing scenery, camping, swimming, hunting, horseback riding, and nature study. Backcountry use levels and management of renewable resources will depend on maintaining ecosystems comparable to those occurring naturally.

The frequency of managerial (law enforcement and patrol) contact with users should be low.

Specific SPNM setting guidelines include:

1. Designate this setting as closed to ORVs.
2. Designate this setting as No Lease or No Surface Occupancy in the oil and gas leasing category.

3. Allow only portable or less impacting seismic exploration in this setting.

4. Withdraw this setting from mineral entry.

5. Allow grazing use subject to restrictions placed on use of motorized vehicles. Limit grazing facilities to those necessary to maintain existing numbers, adequate distribution, and seasons of use, and require design to blend with the existing natural character of the land.

6. Maintain this setting in public ownership.

7. Maintain wildlife numbers in line with natural habitat conditions. Require design of facilities to blend with the existing natural character of the land.

8. Design cultural resource management actions to blend with the existing natural character of the land.

9. Allow no harvest of woodland products except for recreational use.

10. Allow naturally caused fires to burn unless life or property is threatened; utilize nonmotorized suppression methods first.

Semiprimitive Motorized Settings

Recreational activities occurring in this zone include those listed for SPNM, with the addition of ORV use and vehicular support for other activities such as camping.

Frequency of managerial contact with visitors should be low to moderate on trails and primitive roads.

Specific SPM setting guidelines that could be implemented in order to maintain this setting include:

1. Designate this setting as open to ORVs.

2. Designate this setting in the Special Stipulations oil and gas leasing category to require access roads, well pads, and production facilites to blend with the natural character of the land.

3. Allow seismic activity but require routes to be rehabilitated or left in primitive condition at request of BLM.

4. Allow mineral entry, but work with mining claim holders to minimize surface disturbance.

5. Allow grazing use with motorized maintenance. Limit facilities associated with grazing use to those necessary to maintain existing numbers, adequate distribution, and season of use, and require design to blend with the existing natural character of the land.

6. Maintain this setting in public ownership.
7. Maintain wildlife numbers in line with natural habitat conditions. Require design of facilities to blend with the existing natural character of the land.
8. Design cultural resource management actions to blend with the existing natural character of the land.
9. Allow harvest of woodland products for recreation uses only.
10. Allow naturally caused fires to burn unless life or property is threatened; utilize nonmotorized suppression methods first. Suppress man-caused fires with normal methods.

Roaded Natural Settings

Placement of rights-of-way, utility corridors, management facilities, and other surface disturbing activities would be favored in this zone over placement in the P or SPNM zones when applicable.

Specific RN setting guidelines that could be implemented in order to maintain this setting include:

1. Designate this setting as open to ORVs.
2. Designate this setting as in the Special Stipulations oil and gas category to protect scenic values.
3. Allow seismic activity, but with stipulations to protect scenic values.
4. Allow mineral entry, but work with mining claim holders to minimize surface disturbance.
5. Allow grazing use, but work to blend facilities to the character of the land.
6. Maintain this setting in public ownership.
7. Allow woodland products harvest.
8. Utilize normal fire suppression methods.

Rural Settings

This zone would encompass the remainder of the SJRA.

The opportunity to meet these guidelines in some cases could be achieved administratively, as in decisions to allow or not allow seismic activity, and in other cases could be achieved through the RMP. The RMP will be used to designate ORV categories, oil and gas leasing categories, etc. Other guidelines could be met through AMPs or other activity plans generated as a result of the RMP. The optimal extent of each setting could be defined through the RMP; otherwise, the RMP could be used to monitor the acreage actually falling into each setting over time.

Within the SJRA, management opportunities for specific areas have been identified as addressed below.

San Juan River SRMA

Management objectives for the San Juan River should be developed in a SRMA management plan. This would be considered an activity plan and would use resource allocations developed in the RMP/EIS. Grazing use along the river, as it relates to recreation use, would be an allocation issue. The same is true for leasing and mineral restrictions.

The Montezuma Creek to Mexican Hat portion of the river is increasingly being impacted visually by oil and gas and mining activity. Leasing restrictions or mineral withdrawals may be needed to reduce this impact.

The San Juan is listed as a potential study river. The study needs to be done by the NPS before other management actions preclude available options. A recommendation supporting this study could be made administratively.

Use limits need to be evaluated to determine whether they meet objectives for ROS setting along the river and can be supported by available campsites. The current use allocation is 50 percent private and 50 percent commercial, while actual use is about 85 percent private and 15 percent commercial. Private use is increasing faster than commercial use, and private use is being turned away due to reserved commercial launches which go unused. The commercial and private use limits may need to be changed.

In order to reduce the impacts on campsites, additional sites or limits on use may be needed. Restricting key campsites from land based use and grazing use is an option.

A ranger station could be developed at Sand Island to minimize vandalism and litter problems and reduce launches without check-ins. Trash and human waste facilities could be developed at Mexican Hat, Clay Hills, and Montezuma Creek to enhance these areas.

Use allocations and management of campsites could be determined administratively. Alternatively, specific river management options could be covered in an activity plan or river management plan following completion of the RMP. Additional funding for ranger work months could be provided. This is an administrative concern.

Grand Gulch Plateau SRMA

Some of the management actions approved in the Grand Gulch interim management plan have not yet been implemented due to budget or personnel shortages. These items still need to be addressed as outlined in the interim plan. This would be an administrative concern. The interim plan should be superseded by finalizing the SRMA management plan after completion of the RMP/EIS.

Additional funding for ranger work months could be provided. This is an administrative concern.

Dark Canyon PA SRMA

The opportunity exists to develop comprehensive mangement of the Dark Canyon PA. Visitor use information and resource monitoring is now very limited to nonexistent. These activities need to be increased in order to gather basic data for input into a management plan. Trailhead registers need to be installed at the most commonly used access points and a survey conducted to determine the actual use/registration ratio. A campsite inventory and monitoring program need to be implemented. While these activities can be accomplished at the resource area level administratively, the needed 6 work months per year have not been available for this purpose.

Also of concern is the split agency management of Dark Canyon (BLM, USFS, and NPS). Major access points are located within the Manti-LaSal National Forest, and the Sundance Trail crosses Glen Canyon NRA while dropping into Dark Canyon. Cooperation among these agencies is needed to ensure consistent management. This could be done administratively.

A management plan for the SRMA could be developed following completion of the RMP. It would be considered an activity plan and would use resource allocations developed in the RMP/EIS.

San Juan Extensive RMA

Projected increases in sightseeing and ORV use would put additional demand on the Beef Basin and Indian Creek areas. The Montezuma Creek loop could provide additional passenger car accessible opportunities for viewing scenic and archaeological attractions and camping.

The Beef Basin, Indian Creek, Hole-in-the-Rock Trail, and Montezuma Creek areas could be designated as SRMAs to recognize and manage current and projected heavy use. Information should be developed to educate users on the opportunities available and use of the areas. The amount of use and resource conditions could also be monitored. This would require about 6 work months per year. This designation and the followup activities could be done administratively. A management plan for the SRMA could be developed following completion of the RMP. It would be considered an activity plan and would use resource allocations developed in the RMP/EIS.

ACEC POTENTIAL

Several areas in SJRA have potential for ACEC designation to recognize recreation related values. ACECs are based upon relevant and important natural or scenic values. The criteria leading to identification of an area as a WSA or as a P ROS class tend to include these significant natural or scenic values.

The following areas are believed to be significantly important for ACEC designation: a portion of the Grand Gulch Plateau SRMA, Dark Canyon SRMA, and a portion of the San Juan Extensive RMA.

Grand Gulch Plateau SRMA

Within the Grand Gulch Plateau SRMA, a portion of the PA has been identified as having ACEC potential (see figure 4333-1) based on cultural values (cross-reference: Natural History/Cultural Resource Management, Part II). The entire PA, 37,807 acres, and adjoining P ROS class areas, in adjoining WSAs (a total of about 60,000 acres) are believed to have potential for ACEC designation based on recreational values. These areas have been identified in the wilderness review as providing outstanding primitive recreational opportunities in a setting of significant natural and cultural values.

The area is relevant because of the comparatively rare primitive recreational value present. It is regionally and nationally important, based on the amount of visitation received (see table 4333-4).

There are no present conflicts to the PA and adjoining P ROS class areas, although portions of the SRMA as a whole have been subject to minerals exploration activities.

The land ownership of the PA is BLM administered public land or reacquired state land. The majority of the adjacent P class areas are BLM administered public lands with scattered state sections.

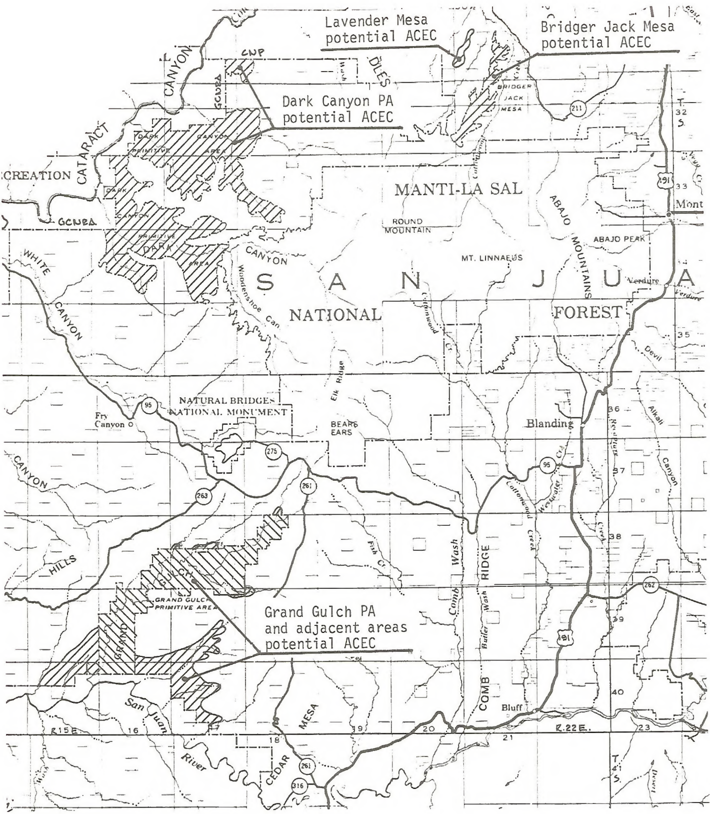
The boundary of the area of primary consideration is the PA. It adjoins the proposed San Juan Wilderness Area in GCNRA on the south. The adjacent P class areas are contiguous with the PA on the southwest and southeast boundaries, and with GCNRA to the south. The P class area to the west (about 5,000 acres) covers a portion of Steer Gulch and Grand Flat (see the Recreation Opportunity Spectrum Classes overlay). The P class area to the east (about 17,000 acres) covers a portion of Slickhorn Canyon and Pollys Mesa. Either or both of these areas could be eliminated from a potential ACEC without significantly altering the primary value, although the Slickhorn Canyon receives more use.

Possible management prescriptions would include continuation of current management within the PA, and adoption of the ROS guidelines given under Management Opportunities, above.

The PA and other areas within the SRMA could also qualify as ONAs, as follows (see figure 4333-2): Grand Gulch, 69,500 acres; Slickhorn Canyon, 25,800 acres; Johns Canyon, 17,500 acres; Fish and Owl Canyons, 40,300 acres; Road Canyon, 24,500 acres; Lime Canyon, 25,300 acres; Mule Canyon, 6,000 acres; and Arch Canyon, 4,200 acres. An area of about 26,000 west of the Grand Gulch ONA described also has some potential as an ONA. An ONA is managed under 43 CFR 8352 to provide the maximum amount of recreation use possible on a fairly large, natural area.

Dark Canyon SRMA

The Dark Canyon SRMA, 62,040 acres, coincides with the Dark Canyon PA and ISA (see figure 4333-1). The area has been documented through the wilderness



Lavender Mesa potential ACEC

Bridger Jack Mesa potential ACEC

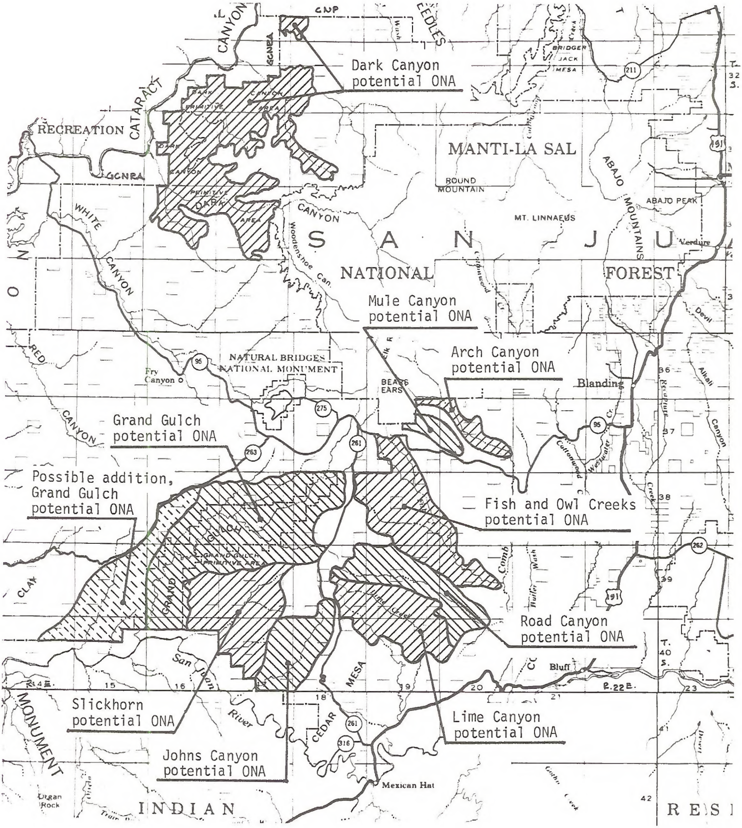
Dark Canyon PA potential ACEC

Grand Gulch PA and adjacent areas potential ACEC

CANYON
CATARACT
CREATION
GCNRA
DLES
BRIDGER
JACK
MESA
211
T.
32
S.
DARK
CANYON
PRIMITIVE
AREA
191
33
Mont
MANTI-LA SAL
ROUND MOUNTAIN
ABAJO MOUNTAINS
ABAJO PEAK
MT. LINNAEUS
WHITE
CANYON
Woodenshoe Can
S A N J U A
Verdure
NATIONAL
FOREST
Cottonwood Cr.
35
Devil
Elk Ridge
95
Fry Canyon
NATURAL BRIDGES NATIONAL MONUMENT
BEARS EARS
Blanding
36
Alkali
Recapture
275
261
263
CANYON
HILLS
Cottonwood Creek
Westwater Cr.
37
Canyon
38
Fish Cr.
Comb Wash
RIDGE
GULCH
GRAND GULCH PRIMITIVE AREA
GRAND
262
Butler Wash
39
191
COMB
Bluff
40
San Juan River
R.15E.
16
17
18
MESA
19
20
21
R.22E.
23
CEDAR
261
316
T.
41
S.

FIGURE 4333-1

Potential ACECs, Recreation



Dark Canyon potential ONA
Mule Canyon potential ONA
Arch Canyon potential ONA
Grand Gulch potential ONA
Possible addition, Grand Gulch potential ONA
Fish and Owl Creeks potential ONA
Road Canyon potential ONA
Slickhorn potential ONA
Johns Canyon potential ONA
Lime Canyon potential ONA
MANTI-LA SAL
SAN JU
NATIONAL FOREST
ABAJO MOUNTAINS
ABAJO PEAK
MT. LINNAEUS
ROUND MOUNTAIN
BRIDGER JACK MESA
RECREATION
CATARACT CANYON
GCNRA
CNP
WHITE CANYON
NATURAL BRIDGES NATIONAL MONUMENT
Fry Canyon
BEARS EARS
Blanding
Verdure
Bluff
Mexican Hat
CEDAR MESA
San Juan River
MONUMENT
INDIAN
RES
Organ Rock
95
261
263
275
211
191
262
316

FIGURE 4333-2

Potential ONAs, Recreation

review as having significant primitive recreation values. The PA offers a diverse ecosystem and numerous natural and scenic values, as documented in the wilderness draft SSA prepared for the area.

The area is relevant because of the comparatively rare primitive recreational values present, and the outstanding quality of those values. It is regionally and nationally important, based on the amount of visitation received (see table 4333-5) and the extremely high quality of values present.

No present land uses threaten the primitive values of the area; however, if not designated as wilderness and released from IMP and PA status, the area could become open for surface development.

The land in the PA is all BLM administered public land or reacquired state land.

The boundary of the potential ACEC coincides with the existing PA. The area adjoins the Dark Canyon Wilderness Area in the Manti-LaSal NF to the east, the proposed Needles Wilderness in CNP to the north, and the proposed Dark Canyon Wilderness in GCNRA to the west. The boundary of the PA is generally defined by topography, and has provided to be a manageable unit.

Possible management prescriptions for the potential ACEC would include continuation of current management within the PA, and adoption of the ROS guidelines given under Management Opportunities, above.

The PA could also qualify, along with the adjacent Middle Point WSA, as an ONA of approximately 68,030 acres. An ONA is managed under 43 CFR 8352 to provide the maximum amount of recreation use possible on a fairly large, natural area.

San Juan Extensive RMA

An area of 5,290 acres corresponding to the Bridger Jack WSA (cross-reference: Wilderness, Part II) and an area of 640 acres on Lavender Mesa have potential for ACEC designation under the recreation program. The special natural values present are documented under ACEC Potential in the Grazing Management chapter (MSA, Part II) and are not repeated here.

In addition to those previously documented values, there are some recreational values related to primitive recreational opportunities in a relict or near-relict plant community. In the past, BLM has proposed Bridger Jack Mesa as an ONA (cross-reference: Natural History/Cultural Resources Management, Part II).

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

The recreation program may be constrained by several other resource programs.

The SJRA contains two ISAs and 15 WSAs totaling 387,020 acres. These areas are subject to management constraints placed upon them by IMP and the regulations as prescribed in 43 CFR 3809. This could constrain recreation use in some of the ROS SPM and RN settings that fall within the WSAs or ISAs.

Grazing use administration is guided by AMPs, which could call for grazing use and facilities in conflict with the guidelines for primitive and semiprimitive settings (cross-reference: Grazing Management, Part II).

Oil and gas activities not in the no-lease or no surface occupancy leasing categories would conflict with guidelines for primitive and semiprimitive settings (cross-reference: Oil and Gas Leasing, Part II).

Lands currently not within existing mineral segregations are subject to entry, exploration, and development. This activity might be in conflict with the objectives of the primitive and semiprimitive classes (cross-reference: Mining Law Administration, Part II).

DOCUMENTED PUBLIC CONTROVERSY

Public comment periods on recreation plans, such as scoping for the San Juan River Management Plan (in 1980) and the draft Grand Gulch Plateau Management Plan (1981), have elicited responses from people representing various points of view. These comments express various points of view on issues such as wilderness, natural history, cultural resources, and energy development.

4333 VISUAL RESOURCES MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Visual Resources Management Classes.

RESOURCE OVERVIEW

The SJRA lies in the Colorado Plateau physiographic province (cross-reference: Topography, Part I). This portion of Utah is characterized (Utah Outdoor Recreation Agency, 1980) by

> high altitudes, myriads of labyrinthine, steep-walled, deep canyons, flatness and horizontality of thick, colorful sedimentary strata, terraced plateaus and mesas bounded by steep cliffs. This highly dissected landscape, in part resulting from steep stream gradients and a youthful erosional cycle, ranges from 5,000 to 12,000 feet in altitude (except for valley floors and canyons). Spectacular scenic value lies in the area's exposed colorful rock layers, rugged and broken terrain, and naturally sculpted sandstone formations such as bridges, arches, and pediments.

Cultural modifications are man-caused changes in the landform, water form, or vegetation, or the addition of a structure that creates a visual contrast in the basic elements of the natural character of a landscape. In the SJRA, these changes include, but are not limited to, fences, pipelines, chainings, reservoirs, mining operations, powerlines, roads, oil and gas developments, and seismic activities. The last three listed above probably have the most significant adverse impact on the visual qualities of the area, and their influence is likely to continue.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

National Laws

FLPMA requires that the public lands be managed in a manner that will protect the quality of the scenic values; identifies scenic values as one of the resources for which public land should be managed; and directs the Secretary of the Interior to prepare and maintain an inventory of all public lands and their resources and other values (including scenic values). FLPMA also requires that each right-of-way contain terms and conditions that will minimize damage to the scenic and aesthetic values.

NEPA requires that measures be taken to assure for all Americans aesthetically pleasing surroundings and requires agencies to ensure the integrated use of environmental design arts in planning and decision making.

SMCRA of 1977 requires that measures be taken to assure that surface coal mining operations are so conducted as to protect the environment.

Bureau Manuals

The BLM Manual 8400 series dictates policy and procedures for the VRM system; outlines procedures for the inventory, evaluation, and classification of visual resources on BLM administered publiclands; provides a framework for establishing guidelines for reducing visual impacts; describes the use of the contrast rating system in analyzing visual impacts; and describes the steps for portraying the visual resource requirements in EAs to determine whether a project can meet acceptable limits of impact on the visual resource.

Instruction Memorandums

84-236 Issues draft VRM manuals 8400, 8410, and 8431 for State Office review and comment. The manual sections have been revised to reflect the new VRM policy set forth in IM 83-409. This new policy direction called for a streamlining of the VRM functions in the Bureau to reduce cost while maintaining an effective VRM system. (These are expected to become final in FY 1985).

84-591 Issues two manual sections (8410 and 8431) as interim guidance. These are to be field tested and then issued as final manual sections prior to the 1985 field season.

UT-83-144 Directs that oil and gas facilities be painted in a uniform color that does not contrast with the surrounding landscape and provides a list of 10 standardized colors from which to select.

RESOURCE ALLOCATIONS

In order to classify visual resources, three determinations (or resource allocations) are required for each area: scenic quality, visual sensitivity, and distance zones.

Scenic quality is perhaps best described as the overall impression retained after driving through, walking through, or flying over an area. Scenery is classified as A, B, or C, with A being the most scenic.

Visual sensitivity, rated as high, medium, or low, is the degree of concern expressed by the user toward scenic quality and existing or proposed visual change in a particular characteristic landscape.

Distance zones are actual quantitative distances from any observation point or travel route (trail, road, or river), with three possible designations: foreground/middleground, background, and seldom seen.

All three resource allocations have been mapped on 1 inch to the mile maps which can be found with the VRM specialist at the MDO.

VRM classes, which are the net result of the inventory work, form the basis for visual input into management decisions. These are formulated considering the combination of scenic quality, visual sensitivity, and distance zones.

Objectives of the four classes are found in the draft VRM 8410 Manual, and are summarized as follows.

Class I Objective

The objective of VRM Class I is to preserve the existing character of the landscape. Only Congressionally authorized areas (e.g., wilderness areas, wild and scenic rivers) or areas approved through the planning process (where the goal is to provide a landscape setting that appears unaltered by man) should be placed in this class. The level of change to the characteristic landscape should be extremely low; very limited development, such as hiking trails, may occur in these areas.

Class II Objective

The objective of VRM Class II is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line,color, and texture found in the predominant natural features of the characteristic landscape.

Class III Objective

The objective of VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV Objective

The objective of VRM Class IV is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location of the project, minimal surface disturbance, and repeating the basic landscape elements.

Contrast Rating

Through the contrast rating process, a determination is made as to whether or not a proposed project would meet VRM class objectives. A contrast rating is done in accordance with the draft VRM 8431 Manual.

The level of change as determined through the contrast rating process is measured against the VRM class objectives given above. To meet the objective for the area in which a project is to be located, the project's level of visual change must be equal to or less than the level of change allowed under the objective.

If the objective would be met, little mitigation is needed to reduce visual contrast. If the objective would not be met, reasonable and practical mitigating measures (which BLM management does not consider to be unduly economically restrictive) are applied to reduce contrasts as much as possible. The project is then approved with stipulations to implement the mitigation.

If, over time, sufficient projects occurred that did not meet class objectives, the scenic quality would be come degraded. At this point, the VRM class could not be maintained, and the class boundaries would have to be adjusted to shift the degraded area into a lower class.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Inventory work in SJRA under the VRM system was begun in 1978 and completed in 1984. Table 4333-17 lists the VRM report name, author, date of completion, and planning units covered. The resulting VRM classes for the SJRA are shows on the VRM Classes overlay, and their acreages are listed in table 4333-18.

The VRM allocations are reviewed periodically, when need for review is determined by the SJRA staff. Changes to scenic quality, visual sensitivity, and distance zones are based on changing field conditions, and the VRM class if adjusted accordingly. For example, in FY 1984, portions of the Beef Basin Planning Unit were re-evaluated and the sensitivity adjusted, which resulted in a change in the VRM class.

Most VRM work is done by private consultants and handled through the MDO, with input from the resource area

All four MFPs are silent on VRM, except that the Indian Creek-Dry Valley MFP recommends examining management actions in Class II areas as seen from Hatch Point (in the Grand Resource Area), U.S. Highway 191, and developed recreation sites to protect the scenic resource.

TABLE 4333-17

Summary of Visual Resource Inventory Work

Report Name	Author and Date	Planning Unit(s)
Visual Resource Inventory and Analysis of South-Central Utah Regional Area	Meiiji Resource Consultants 1980	Monticello, Dry Valley, and Beef Basin
South San URA Step III/ Step IV Recreation, VRM	Ron Ray (BLM), 1978	South San Juan
Visual Resource Inventory of Southeastern Utah Regional Area	Robert Talley (BLM), 1984	Montezuma

TABLE 4333-18

Acreages in Each of the Visual Resource Management Classes

Class	Acres
Class I	93,536
Class II	525,289
Class III	620,834
Class IV	539,534

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County.

For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

Tourism is the industry most dependent on visual resources in the SJRA. The local importance of tourism was discussed earlier in this chapter under Recreation Management. Although recreation accounts for a significant proportion of the county's economic activity, the proportion of this local economic activity that is due to the area's visual resource cannot be quantified.

Most surface disturbing activities affect visual quality to some degree and are therefore dependent on management decisions for visual resources. To this date (mid-1985), VRM has not prevented any economic activity in the SJRA. Although most stipulations designed to protect visual resources impose a cost on surface disturbing activities, these stipulations are generally not economically restrictive. The activities most frequently altered to accommodate visual resources include oil and gas facilities, pipelines, roads, and range and wildlife projects.

The kinds of changes most often imposed on these activities are relocation, painting the facilities, and redesigning and reconfiguring the land disturbance.

Economic theory suggests that increasing the cost of an input will decrease the demand for that input. In this case, the input is public land for surface disturbing activity. However, the cost imposed by VRM restrictions has been low, and the amount of surface disturbing activity has not been noticeably affected.

The local economic effect of VRM is mixed. Although the cost of restrictions could reduce the amount of surface disturbing activity, some local expenditures can be attributed to these added costs. Reducing surface disturbing activities would reduce local economic activity, whereas increasing local expenditures would increase local economic activity. In any event, the effect has been insignificant to the local economy and to any individual or business.

Stipulations to protect visual quality, if very costly or economically restrictive to the developer, could affect local economic activity.

Little or none of the governmental cost related to managing visual resources in the SJRA contributes to local sales, income, or employment.

Management of visual resources affects the revenues and costs of local taxing jurisdictions only as far as it affects other economic activities. Because the relationship between VRM and economic activities cannot be quantified, the local fiscal effects cannot be quantified.

CONSISTENCY WITH NON-BUREAU PLANS

The USFS, which has its own visual management system, manages its lands in a multiple use manner, as does the Bureau. Visual concerns are given equal consideration with other potential environmental impacts.

Visual resources have also been considered in the GCNRA Proposed General Management Plan (1979). Although the NPS has no designated VRM system, that agency appears to have adopted the BLM system, with some modification, by establishing different classes of scenery.

In the late 1970s, the visual corridor along highways U-95, U-261, U-263, U-276, and Notom Road was studied by an interagency group composed of federal, state, and county representatives. The group examined potential conflicts in use and development of lands along these highways.

The U-95 Highway Corridor Study states, "Preservation of the visual corridor is a vital issue in consideration of any use, management, or development scheme for the area."

The study recognizes the visual elements of the corridor and provides a basis for analysis of each specific proposed use or development. The approach envisions a continuing process of analysis of each proposal and allows for prohibiting the proposal or minimizing its impacts. All who have a vested interest in, or who have control over the use, management, or development of the land, must accept the premise that natural landscape values are worth protecting and that these values require a unified commitment to their preservation. The study acknowledges the need for some mechanism for review of proposals or standardized criteria for assessment against the visual resource values.

As a result of this study, BLM has coordinated with the State Land Board on chainings and other land treatments to minimize visual impacts as viewed from Highway U-261.

DATA GAPS

None identified.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

The current (1984) demand for visual quality or sightseeing might best be measured by the number of tour operators conducting business in the SJRA (cross-reference: Recreation Management at the beginning of this chapter).

The current demand for development of other resources (e.g., energy) affects visual quality within the SJRA. Oil and gas exploration (e.g., seismic activity) and extraction (e.g., well and pump facilities, maintenance roads) have the most significant adverse impact (cross-reference: Oil and Gas Leasing, Part II).

Because all VRM inventory work for the resource area has been completed, all current demands on the program for this type of work have been met. The most recently completed inventory (Montezuma Planning Unit) required 1 work month in FY 1984 and 1.4 work months in FY 1985.

Current demands for visual impact analysis of proposed and existing projects are being met. Work time for each analysis is coded to the benefiting activity.

The capability of the resource area to absorb these impacts is fairly high where developments are infrequent, and low in areas of concentrated development where scenic qualities are substantially reduced.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

To guarantee sustained yield of the visual resource while meeting future demands, management must adhere strictly to the VRM class objectives. Only those projects that meet objectives could be approved.

Because all inventory work has been completed for the resource area, it is not anticipated that more than 1 work month per FY would be needed for VRM in future years. This does not include visual assessment work charged back to specific program subactivities.

CRITICAL THRESHOLDS

For individual projects, critical threshold levels that need to be considered in analyzing impacts to visual resources are the levels of change given in the VRM class objectives listed earlier. A threshold would be crossed when the project's impacts to the visual resource exceed the level of change allowed for the VRM class for that area. For cumulative impacts from several projects, critical threshold levels would be crossed when the scenic quality of an area is so significantly degraded that the VRM class is lowered. This point cannot be projected until specific projects are proposed.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

VRM classes have been determined for the entire resource area.

Degradation of visual values is prevented where only those potential projects that meet VRM class objectives are approved.

The SJRA has been successful in meeting VRM class objectives in most cases. Current management is believed to be adequate.

MANAGEMENT OPPORTUNITIES

An opportunity for mitigation of irreversible and irretrievable commitments of visual resources is to use the BLM visual resource specialist in the initial planning and design of a project. Irreversible and irretrievable commitments of visual resources could be reduced through the application of the three principles of VRM: (1) minimizing disturbance, (2) careful location, and (3) repeating the natural elements. This, however, is an administrative concern which does not need to be considered in the planning process.

ACEC POTENTIAL

Lockhart Basin

An area of 62,420 acres (56,660 BLM and 5,760 State) has potential for ACEC designation under the VRM program. The area includes lower Indian Creek, Rustler, Horsethief, and Lockhart Canyons and is located basically between CNP and Hatch Point (figure 4333-3).

This area meets the two ACEC recommendation criteria set forth in draft BLM Manual 8410: it is scenic quality A, and unique or very rare within its physiographic province.

The special value identified is one of outstanding scenic qualities in terms of diversity of landform and colors present. The landform within the area is typified by outstanding rock formations, including rounded spires; high, truncated ledges; and cliffs. The colors, ranging from light pink and white sandstones along the lower Indian Creek area to the white, pink, red, and dark reddish-purple colors in the ledges and rock formations are outstanding. The color contrasts add to the scenic quality of this area, and some of the most spectacular rock formations in the U.S. are found here (Meiiji, 1979).

The scenic values found in the area are relevant because special management attention is required to prevent irreparable damage to them. The scenic values of this area are important to regional, national, and international travelers or tourists who view the area from the developed overlooks in the Canyon Rims Recreation Area. These overlooks and their estimated use (number of visitors in 1981) include Needles Overlook, 10,000; Anticline Overlook, 3,000; and Canyonlands Overlook, 100 (DOE, 1982). Comments in the visitor registers located at the overlooks include such remarks as "More scenic than the Grand Canyon," "Leave it as it is," and "Don't change it," etc.

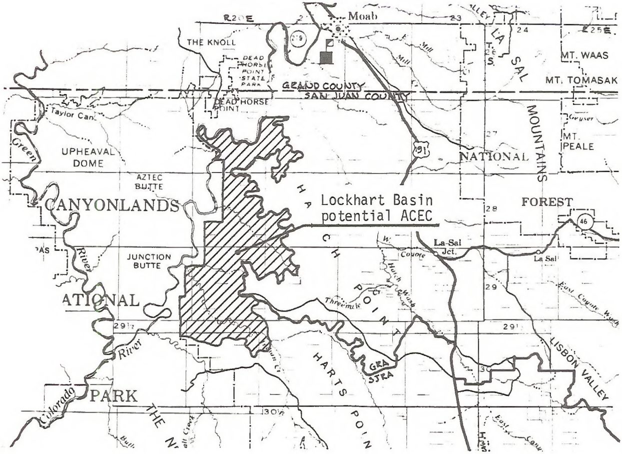

Lockhart Basin
potential ACEC
Moab
R20E
THE KNOLL
DEAD HORSE POINT STATE PARK
DEAD HORSE POINT
GRAND COUNTY
SAN JUAN COUNTY
LA SAL MOUNTAINS
NATIONAL
FOREST
MT. WAAS
MT. TOMASAK
MT. PEALE
Taylor Can.
Green
UPHEAVAL DOME
AZTEC BUTTE
CANYONLANDS
JUNCTION BUTTE
ATIONAL
PARK
River
Colorado
HATCH POINT
HARTS POIN
La Sal Jct.
La Sal
Coyote
Hatch Wash
Threemile
East Coyote Wash
LISBON VALLEY
191
46
279

FIGURE 4333-3

Potential ACEC, Visual Resources

The scarcity within the Colorado Plateau Physiographic Region of the combination of scenic qualities found in this area makes it an important resource that would be irreplaceable if damaged or destroyed.

No present land use threatens the scenic values of the area; however, exploration for uranium or oil and gas could adversely affect these values by creating substantially noticeable disturbances.

The land ownership of the area is primarily public lands, with state sections scattered throughout.

The western boundary of the area is CNP, where recreational use does not affect the scenic qualities described above.

Withdrawal from locatable mineral entry and application of a No Surface Occupancy leasing category for oil and gas development would protect the scenic values from irreparable damage that could be caused by these activities.

No other special designations would apply to protection of scenic values other than ACEC.

The NPS at one time considered enlarging the boundaries of CNP to include this area.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Management of visual resources is constrained by nearly all other resource management programs that propose surface disturbance or development of their respective resources in areas where VRM objectives cannot be met. If objectives are repeatedly not met, then the scenic qualities will be substantially reduced and the VRM class lowered through periodic reassessment by BLM VRM specialists. Lowering of the VRM class is inconsistent with the BLM's policy of protecting visual values.

Reassessment of visual resource values would aprobably coincide with the 5-year periodic review of the RMP, but VRM classes are established independently of the planning process.

DOCUMENTED PUBLIC CONTROVERSY

Public controversy over visual impacts from the Department of Energy's proposed baseline studies in the Gibson Dome area are documented in the final EA, with over 67 comments received.

A newspaper article in the Deseret News (Bauman, 1982) discussed the visual impact of temporary water tanks located at an exploratory drill hole in Gibson Dome.

8320 - PLANNING FOR RECREATION RESOURCES

Description of Recreation Opportunity Spectrum Classes

The enclosed chart describes each of the six ROS classes in terms of: (1) experience opportunities; (2) setting opportunities, and (3) activity opportunities (see also Glossary of Terms). These descriptors provide a general overview of the opportunities included in each class. These overview statements do not describe each class in detail, but rather provide a point of departure from which the planner or manager can develop more precise prescriptions for each class based on specific situations encountered in field operations. The listing of activity opportunities is provided for illustrative purposes. It is not an all-inclusive list of activity opportunities on the public lands.

THE RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

Opportunity Class	Experience Opportunity	Setting Opportunity	Activity Opportunity
Primitive	Opportunity for isolation from the sights and sounds of man, to feel a part of the natural environment, to have a high degree of challenge and risk, and to use outdoor skills.	Area is characterized by essentially unmodified natural environment of fairly large size. Concentration of users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of man-induced restrictions and controls. Only facilities essential for resource protection are used. No facilities for comfort or convenience of the user are provided. Spacing of groups is informal and dispersed to minimize contacts between groups. Motorized use within the area is not permitted.	Camping, hiking, climbing, enjoying scenery or natural features, nature study, photography, spelunking, hunting (big game, small game, upland birds, waterfowl), ski touring and snowshoeing, swimming, diving (skin and scuba), fishing, canoeing, sailing, and river running (nonmotorized craft).
Semi-Primitive Nonmotorized.	Some opportunity for isolation from the sights and sounds of man, but not as important as for primitive opportunities. Opportunity to have high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills.	Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other area users. On-site controls and restrictions may be present, but are subtle. Facilities are provided for the protection of resource values and the safety of users only. Spacing of groups may be formalized to disperse use and limit contacts between groups. Motorized use is not permitted.	Camping, hiking, climbing, enjoying scenery or natural features, nature study, photography, spelunking, hunting (big game, small game, upland birds, waterfowl), ski touring and snowshoeing, swimming, diving (skin and scuba), fishing, canoeing, sailing, and river running (nonmotorized craft).

THE RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS—*Continued*

Opportunity Class	Experience Opportunity	Setting Opportunity	Activity Opportunity
Semi-Primitive Motorized.	Some opportunity for isolation from the sights and sounds of man, but not as important as for primitive opportunities. Opportunity to have high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. Explicit opportunity to use motorized equipment while in the area.	Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other area users. On-site controls and restrictions may be present, but are subtle. Facilities are provided for the protection of resource values and safety of users only. Spacing of groups may be formalized to disperse use and limit contacts between groups. Motorized use is permitted.	Same as the above, plus the following: ORV Use (4-WD, Dune Buggy, Dirt Bike, Snowmobile), Power Boating.
Roaded Natural	About equal opportunities for affiliation with other user groups and for isolation from sights and sounds of man. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities are not very important except in specific challenging activities. Practice of outdoor skills may be important. Opportunities for both motorized and nonmotorized recreation are present.	Area is characterized by a generally natural environment with moderate evidence of the sights and sounds of man. Resource modification and utilization practices are evident, but harmonize with the natural environment. Concentration of users is low to moderate with facilities sometimes provided for group activity. On-site controls and restrictions offer a sense of security. Rustic facilities are provided for user convenience as well as for safety and resource protection. Conventional motorized use is provided for in construction standards and design of facilities.	All activities listed previously, plus the following: picnicking, rock collecting, wood gathering, auto touring, downhill skiing, snowplay, ice skating, water skiing and other water sports, hang gliding, interpretive use, rustic resorts and organized camps.
Rural	Opportunities to experience affiliation with individuals and groups are prevalent as is the convenience of sites and opportunities These factors are generally more important than the natural setting. Opportunities for wildland challenges, risk taking, and testing of outdoor skills are unimportant, except in those activities involving challenge and risk.	Area is characterized by substantially modified natural environment. Resource modification and utilization practices are obvious. Sights and sounds of man are readily evident, and the concentration of users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for specific activities. Developed sites, roads and trails, are designed for moderate to high use. Moderate densities are provided far away from developed sites. Facilities for intensive motorized use are available.	All activities listed previously, plus the following: competitive games, spectator sports, bicycling, jogging, outdoor concerts, and modern resorts.

THE RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS—*Continued*

Opportunity Class	Experience Opportunity	Setting Opportunity	Activity Opportunity
Modern Urban	Opportunities to experience affiliation with individuals and groups are prevalent as is the convenience of sites and opportunities. Experiencing the natural environment, and the use of outdoor skills are largely unimportant.	Area is characterized by a highly modified environment, although the background may have natural elements. Vegetation is often exotic and manicured. Soil may be protected by surfacing. Sights and sounds of man, on-site, predominate. Large numbers of users can be expected. Modern facilities are provided for the use and convenience of large numbers of people. Controls and restrictions are obvious and numerous. Facilities for high intensity motor use and parking are present with forms of mass transit often available.	All activities listed previously.

alternatives to be displayed in the plan. The council will also be requested to provide input and comment on a draft decision criteria to be used in selecting a preferred alternative for the Resource Area.

The meeting is open to the public; anyone wishing to make a presentation to the Council should contact the District Manager at least five days prior to the meeting.

Dave Jones,

District Manager, Grand Junction District.

[FR Doc. 81-1465 Filed 1-14-81; 8:45 am]

BILLING CODE 4310-84-M

Redding District Multiple Use Advisory Council; Meeting

January 10, 1981.

Notice is hereby given in accordance with Pub. L. 94-579 and 43 CFR Part 1780, that a meeting of the Redding District Multiple Use Advisory Council will be held on Wednesday and Thursday, February 18 and 19, 1981, beginning at 8:00 a.m. on both days at the Bureau of Land Management Office, 355 Hemsted Drive, Redding, California.

The agenda for the meeting will include:

February 18, Wednesday

1. Field trip to Trinity County Area, for an on-the-ground orientation to District programs and planning issues.

February 19, Thursday

1. Follow-up discussion of February 18, field trip.
2. Continuing orientation to District issues and programs.
   a. FY-81 Annual Work Plan
   b. Mt. Dome Environmental Statement
   c. Planning Criteria for Planning update
   d. Surface Management Regulations
   e. Wilderness Study Status
   f. Deer Mitigation Proposal for Cottonwood Creek Dam Project
   g. Future Meeting and Agenda Topics

The meeting is open to the public. Interested persons may make oral statements to the Council or file a written statement that can be considered by the Council. The public is invited to accompany the Council on the field trip, however, transportation will only be furnished for the Advisory Council.

Public statements will be heard between 1:00 and 2:00 p.m., on February 19, 1981, or as pre-arranged with the District Manager.

Summary minutes of the Council meeting will be maintained in the District Office and available for public inspection during normal business hours within 30 days following the meeting.

Stanley D. Butzer,

Redding District Manager.

[FR Doc. 81-1348 Filed 1-14-81; 8:45 am]

BILLING CODE 4310-84-M

Ukiah District Advisory Council; Meeting

Notice is hereby given in accordance with the Federal Land Policy and Management Act of 1976 (Pub. L. 94-579, Sec. 603 as amended; 90 Stat. 2743-2794) that a meeting of the Ukiah District Advisory Council will be held on February 12, 1981.

The meeting will begin at 9 a.m. at Financial Federal Public Meeting Room, 700 South State Street, Ukiah, California. The proposed agenda is:

1. Report on Cow Mountain Prescribed Burn.
2. Update on state in-lieu selections.
3. Update on wilderness.
4. Access/exchange of isolated parcels.
5. Recommendations on timber management.
6. BLM priority issues.
7. Open discussions of other public lands issues as requested by Council members.

All Advisory Council meetings are open to the public. Oral statements of no more than 10 minutes specifically addressing agenda items may be addressed to the Council by the public from 3:30 p.m. to 4:30 p.m., or written statements may be filed with the District Manager by February 11 for consideration by the Council. Only new information, not heretofore presented, will be accepted by the Council.

Edwin G. Katlas,

Acting District Manager.

January 9, 1981.

[FR Doc. 81-1350 Filed 1-14-81; 8:45 am]

BILLING CODE 4310-84-M

Utah; River Running Recreation Use Permits and Allocations; Updated Criteria and Procedures

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of updated criteria and procedures for river running recreation use permits and allocations.

SUMMARY: In 1974, the Utah State Director for the Bureau of Land Management establishment criteria for issuing commercial permits and for setting amounts of use (allocations). Noncommercial permits were also required so that use could be managed within acceptable limits. These criteria have been in effect from 1974 through 1980. The purpose and intent of these procedures is to update and clarify existing criteria, policy and guidelines.

Notice is hereby given that pursuant to Section 102(a)(8) of the Federal Land Policy and Management Act of 1976, the Land and Water Conservation Fund Act, as amended, and 36 CFR 1 and 43 CFR 2920, 8370 and 9230, the following sets forth criteria and procedures for river running recreation use permits and allocations for the portions of the Colorado, Green, Dolores and San Juan Rivers managed by the Moab District. These procedures become effective upon date of publication and supersede previous criteria found in Federal Register, Vol 41, No. 73—Wednesday, April 14, 1976. They will remain in effect unless modified by future publications in the Federal Register or superseded by river management regulations published by the Secretary of the Interior.

I. General Information

A. Noncommercial

The Moab District manages portions of the Colorado, Green, Dolores and San Juan Rivers. So that use can be managed within acceptable limits for protection of the environment, noncommercial float trip permits are required on the following rivers and may be obtained from the offices listed.

Grand Resource Area, Sand Flats Road, P.O. Box M, Moab, Utah 84532, Phone: (801) 259-6111, Ext. 211

San Juan Area Office, 284 S. 1st W., Monticello, Utah 84535, Phone: (801) 587-2201

Price Area Office, P.O. Box AB 900 North 7th East, Price, Utah 84501, Phone: (801) 637-4584

Colorado River

Westwater Canyon, Cisco Landing to Castle Creek

Dolores River

Utah line to Colorado River, Confluence

San Juan River

Montezuma Creek to Clay Hills Crossing

Green River

Desolation/Gray Canyon

A separate permit is required for each noncommercial trip being planned.

The following requirements apply to noncommercial permit applicants. This means that trip participants must equally share the costs. No one may receive a salary, gratuity, or increase his or her net worth or amortize equipment costs on a noncommercial trip. Trips by organized groups, strictly educational groups, youth groups, research groups, etc., will be considered on a case-by-case basis and must meet the spirit and intent of a noncommercial trip as stated above.

B. Commerical

Commercial river permits are issued annually by the Moab District Office. Each permittee receives a permit based on his established allocation. Requests for subsequent years' use may not exceed previous allocated use, and may only be for those areas the permittee was permitted the previous year. The only exceptions will be Cisco Landing to Castle Creek on the Colorado River and Nefertiti Rapid to Swasey's Rapid on the Green River. A permittee may apply for unlimited amount of passenger days. However, until the river management plan for the Colorado River above Castle Creek is completed, no *new* permits for use on this portion will be issued. In summary, it is the BLM policy in Utah to only issue permits to outfitters who held permits the previous year. If a permit lapses because of failure to apply in a timely manner, or is cancelled for cause, (in accordance with 41 IBLA 132, dated June 14, 1979) the outfitter will be treated as a new applicant. Until management plans which determine proper carrying capacity and use distribution are completed on these rivers. BLM will not be issing any new commercial recreation use permits.

C. Search and Rescue

The cost of any search and rescue operation must be borne by the person(s) for whom this service is rendered. This includes the cost of aircraft rental.

D. Trespass

When a trespass situation is identified, the management response is to levy a trespass fee against the pemittee, to inform the operator that he will not be issued any type of permit on the river for a specified period of time, and, in some cases, to obtain the assistance of State Park Rangers to issue citations for violation of the State boating regulations. Prosecution under federal law may follow. This improved management response has reduced river pirate operations during the last few years, but it has not eliminated the problem. Other methods, such as following up on complaints from legitimate permit holders and talking to passengers on suspect trips, could be employed to help stop the pirate problem.

E. Conditions of Use

ALL COMMERCIAL USERS are required to adhere to and/or are governed by the following conditions:

1. No value may be accrued to the permit.

2. Nonrefundable rental fees must be paid in advance at the rate of $120/100 multi-day passenger days and $50/100 daily passenger days based on the allocation given with the permit.

3. The permit may not transferred, sublet or entered into third party agreements without BLM approval.

4. Allocations may be reduced for failure to make substantial use for two or more consecutive years.

5. Commercial river runners are, as part of their permit, subject to the State and Coast Guard boating laws and regulations as applicable to use on the waterways in Utah.

6. For protection of the environment and potential wild river values, the following maximum party sizes per trip are established.

Colorado River Westwater Canyon—25 persons, Green River Desolation-Gray Canyon—25 persons, Dolores River—25 persons, San Juan River—25 persons, Colorado River Rose Ranch to Castle Creek—No party size limitation.

Green River—Nefertiti Rapid to Swasey's Rapid—no party size limit.

7. Camp areas may be closed when necessary to protect the related ecosystems and resources, or prevent litter buildup.

8. For protection of the environmental values and safety of the passengers, special stipulations in addition to those listed above are made part of the permit. A complete list of these stipulations can be obtained from BLM Moab District, P.O. Box 970, Moab, Utah 84532.

ALL NONCOMMERCIAL USERS are required to adhere to and/or are governed by the following conditions:

1. Check in with river rangers at launch sites for Westwater, Desolation-Gray and San Juan Rivers.

2. Group Size Limits: Only one launch per group per day is allowed with a maximum group size of:

Colorado River: Westwater—25 people (reservations required). Cisco Landing to Castle Creek—No limit.

Green River: Desolation/Gray Canyon—25 people (reservations required). Nefertiti Rapid to Swasey's Rapid—No limit.

San Juan River: 25 people.

Dolores River: (Utah State line to confluence)—25 people.

3. State laws regarding boating safety must be complied with. The laws most applicable to BLM rivers are the following:

a. Each person must wear a Type I, II, III, or V Coast Guard approved personal flotation device *at all times* while on the river (except on designated flat water sections as defined in the Utah State Boating Act, as amended) which must be in serviceable condition at the time of launch. Type I or V are preferable.

b. Each vessel must have an extra oar, paddle, or a spare motor as applicable, and an extra life jacket.

c. Each group must carry a bail bucket or bilge pump except for kayaks, canoes, sport yaks, or self bailing inflatables.

4. Each group must carry a first aid kit or kits adequate to meet the size and needs of the group involved.

5. Each group must carry a repair kit or kits adequate to meet the size and needs of the group.

6. Each group must carry an air pump or pumps adequate to meet the size and needs of the group.

7. Litter of any kind may not be discarded in the rivers, along the shore, or in adjacent canyons. Burn or carry out all burnables. Carry out all unburnable material including cans, bottles, leftover food, egg shells, melon rinds, pop tops, cigarette butts, and foil base wrappers.

8. All trips must carry portable toilets. The only exception to this will be kayak, sport yak, or white water canoe trips without a support boat, and daily trips on Westwater. All portable toilet waste must be carried out of Westwater and Desolation/Gray Canyons and deposited in an authorized sewage disposal facility. On other rivers, if toilet waste is buried, it will be done in a hole at least two feet deep and ten feet above the water line, 50 feet laterally from high water line, and 300 feet from any camping area. If chemicals are used, they must be biodegradable.

9. The use of gas or propane stoves is strongly encouraged for cooking. Fire pans must be used for all campfires. Carry out unburned charcoal or deposit in main current of river. All unburnable litter must be removed from the fire pan before charcoal is put in the river. Build fires only below high water line away from any vegetation or combustible material. If fires are built, use only driftwood from along the river bank below high water line. Do not cut or burn live trees or standing dead trees and snags.

10. Wash dishes away from the river and use only biodegradable soap. Do not bathe or wash in any tributary streams.

11. Do not remove, damage, or destroy any archaeological, historical, or ecological resource. To do so is a violation of both federal and state law.

12. The permittee assumes direct responsibility for his group and their conduct. The group leader shall be responsible for the conduct of the parties while within the National

Recreation Area and on BLM administered land and shall enforce the common rules of good conduct with full recognition of the rights and privileges of other visitors who may be using the same facilities or areas.

II. Specific Area Information

A. Green River—Desolation/Gray Canyons

Noncommercial permits will be sent on request after January 1. Permit applications will be accepted between January 1 and March 1. Weekend dates, holidays and the first two weeks of June are high use periods. Applicants should submit first, second and third choices when requesting launch dates. In mid-March, a lottery will be held to determine launch dates when there are more applicants for a date than available launches. Any remaining dates will be issued on a first come, first serve basis. This reservation system is designed to minimize congestion and impacts on the canyon. Failure to cancel reservations at least five days prior to your schedule use will result in future loss of permit privileges.

For the 1981 season, the Desolation/Gray Canyons launch schedule will be as follows:

A. COMMERCIAL

May 1–22—One commercial launch per day.

May 23–September 7—Three commercial launches per day, with the exception that there will be five (5) three (3) day periods during these dates where there will only be one commercial launch per day allowed.

September 8–30—One commercial launch per day.

B. NONCOMMERCIAL

May 15–August 15—Three noncommercial launches per day.

August 16–May 14—One noncommercial launch per day.

Group size will be a maximum of 25 persons per trip for noncommercial trips and 25 persons plus boatman for commercial trips.

A county maintained road paralleling the river on the east side of the rive between Nefertiti Rapid and Swasey's Rapid creates special management problems and opportunities in that portion of the canyon. The existence of the road makes it possible for single day float trips to launch on the river at Nefertiti and it also provides access for individuals desiring to fish, swim, tube in the river, picnic, etc. The problems relating to day use float boating, and to the other uses, make it unrealistic to manage this portion using the same approach employed on the wilderness sections of the river. This necessitates a separate management system for day use float boating on the portion of the river between Nefertiti Rapid and Swasey's Rapid. The elements of this system would include the following:

(a). Private use permits will be required for day use when additional use demonstrates the need and additional onsite manpower can be funded.

(b). Commercial permits will be available to operators with a current permit for Desolation and Gray Canyons.

(c). Permits will be considered for special uses such as canoe and kayak schools and other related uses other than commercial allocated outfits.

B. Colorado River—Westwater Canyon

A maximum of six (6) launches per day are allowed on this river segment with an allocation of 10.000 passenger days. These six launches are divided equally between commercial and private use (three commercial and three private launches per day). Each launch is permitted 25 passengers until such time that the respective 5,000 passenger day allocation is reached.

Commercial use reservations are based upon the previous years' use pattern to allow outfitters the opportunity to plan ahead with trip schedules and advertising brochures. These reservations will be conformed by September 30 of each year through the use of a launch calendar. Thereafter, reservation dates may be traded between outfitters by notifying the Grand Resource Area Manager at least 24 hours in advance.

Commercial land reservations will be confirmed based in a formula of one launch per 10 passenger days for one day trips, or 20 passenger days for one day trips, or 20 passenger days for two day trips. Example: An outfitter holding a 200 passenger day permit could be awarded ten (10) launch dates for one day trips plus five (5) launch dates for two day trips.

Beginning October 1st of each year, any confirmed dates may be exchanged for open dates on a first come, first serve basis. Also beginning October 1st of each year, additional launches in excess of the formula may be awarded at the discretion of the Grand Resource Area Manager upon presentation of demonstrated need. Private launch reservations are required two months in advance of the planned launch date. For example:

Applications received in: March for launch dates in: May

Applications received in: April for launch dates in: June

Applications received in: May for launch dates in: July

Applications received in: June for launch dates in: August

Applications received in: July for launch dates in: September

Applicants submit first, second and third choices as competition is keen for some dates. Where necessary, a drawing is held to resolve conflicts. At the close of each application filing month, reservations are posted and sent to each applicant. Ten (10) days following the close of the filing period, unfilled dates may be reserved on a first come, first serve basis. This reservation system is designed to minimize congestion and impacts on the canyon. Failure to cancel reservations at least 3 days prior to your scheduled use will result in future loss of permit privileges.

Permits for private trips and reservations for all trips (commercial and private) are obtained in advance from the BLM Grand Resource Area Manager at P.O. Box M, Moab, Utah 84532.

C. Dolores River (Utah Section)

A permit available from the Bureau of Land Management, Grand Resource Area, P.O. Box M, Moab, Utah 84532 is required for this river segment.

General guidelines for white water river use on the Colorado River also apply to the Dolores River. In addition to the general requirements, there is a 25 people maximum party size and only one launching per party.

Most people prefer to launch just below the Highway Bridge at Gateway, Colorado and takeout just below the Dewey Bridge on the Colorado River. The 31 mile trip takes about two days.

D. San Juan River

The San Juan River flows through southwest Utah from New Mexico and Colorado. The river flows through Glen Canyon National Recreation Area, Bureau of Land Management administered lands and the Navajo Indian Reservation. The Park Service administers the free flowing section of the river from Clay Hills Crossing to approximately the Honaker Trail (39.0 miles). The BLM administers the river from the Honaker Trail to Montezuma Creek (61 miles). The remaining portion of the river in Utah runs through the Navajo Reservation (28.8 miles).

The BLM and the National Park Service (NPS, Glen Canyon National Recreation Area) have entered into a management agreement concerning the management and the permit system along the San Juan River.

Under this agreement, BLM has assumed the responsibility of issuing all private permits for the river (1979) and commercial permits (starting in 1981).

This agreement has set a precedent in the management of public lands. This is the first time NPS has given the recreation management of their lands to another agency.

Beginning with the 1980 River Use Season, a maximum party size of 25 persons per trip for noncommercial trips, and 25 persons plus boatman for commercial trips was established for the protection of the environment and potential wild river values of the San Juan River from Sand Island to Clay Hills Crossing. A maximum passenger day limit of 75 people per day at Sand Island launch ramp and Mexican Hat launch ramp (12 month use season) has been established for three (3) years (1980 through 1982 river use seasons).

Patrols on the river are carried out jointly by the NPS and BLM. The end result of this agreement is expected to save money on equipment, personnel and the amount of time the visitor spends acquiring and filling out permit forms to run the river.

A permit available from the Bureau of Land Management, San Juan Resource Area, P.O. Box 7, Monticello, Utah 84535, is required for this river.

E. Green River—Labyrinth Canyon

At present, there are no application or permit requirements, use restrictions, or other type of restriction on this river. Trip length averages three days in high water for unmotored craft. Distance floatable between launch and takeout is 68 miles. Shuttle distance is approximately 65 miles via major highway and gravel roads. Air access is at launch (utilizing Green River, Utah airport). Most people prefer to launch at the Green River State Park boat ramp, Green River, Utah, and takeout at the Mineral Canyon boat ramp.

The river has no rapids. Ice flows and frozen sections of river make winter trips impracticable.

FOR INFORMATION WRITE: Area Manager, San Rafael Resource Area, P.O. Drawer AB, Price, Utah 84501.

DATE: Effective January 1, 1981.

ADDRESS: District Manager, Bureau of Land Management, P.O. Box 970, Moab, Utah 84532.

FOR FURTHER INFORMATION CONTACT: District Manager, Moab District (801) 259-6111.

S. Gene Day,

District Manager.

January 8, 1981.

[FR Doc. 81-1338 Filed 1-14-81; 8:45 am]

BILLING CODE 4310-84-M

[W-73282 and W-73283]

Wyoming; Invitation for Coal Exploration Licenses; Sohio Western Mining Company

January 5, 1981.

Sohio Western Mining Company hereby invites all interested parties to participate on a pro rata cost sharing basis in its coal exploration programs concerning Federally owned coal underlying the following-described land in Campbell County, Wyoming:

W-73282—(Hay Creek Area)

Sixth Principal Meridian, Wyoming

T. 52 N., R. 72 W.,
  Sec. 3, Lots 2, 3, 4, S½NW¼, and W½SW¼;
  Sec. 4, Lots 1–4, S½N½, and S½ (All);
  Sec. 5, Lots 1–4, S½N½, and S½ (All);
  Sec. 8, All;
  Sec. 9, N½NE¼, and NW¼;
  Sec. 10, NW¼NW¼;
  Sec. 17, All.
T. 53 N., R. 72 W.,
  Sec. 33, All;
  Sec. 34, S½S½, and NW¼SW¼.
  Containing 3,968.84 acres.

W-73283—(North Rawhide Creek Area)

T. 52 N., R. 72 W.,
  Sec. 20, All;
  Sec. 21, All;
  Sec. 27, W½;
  Sec. 28, All;
  Sec. 29, N½, SW¼, NW¼SE¼;
  Sec. 32, N½N½;
  Sec. 33, NE¼, and E½SE¼;
  Sec. 34, NW¼, NE¼SW¼, and W½SW¼.
  Containing 3,520.00 acres.

All of the coal in the above lands consists of unleased Federal coal within the Powder River Basin known recoverable coal resource area. The purpose of the exploration programs is to determine the quality and quantity of the coal and character of overburden by drilling, sampling and testing.

Detailed descriptions of the proposed drilling programs are available for review during normal business hours in the following offices (under Serial Numbers W-73282 and W-73283): Bureau of Land Management, 2515 Warren Avenue, Cheyenne, Wyoming 82001 and the Bureau of Land Management, 951 Rancho Road, Casper, Wyoming 82601.

This notice of invitation will be published in this newspaper once each week for two (2) consecutive weeks beginning the week of January 12, 1981, and in the Federal Register. Any party electing to participate in the exploration programs must send written notice to both the Bureau of Land Management and Sohio Western Mining Company no later than February 17, 1981. The written notices should be sent to the following addresses: Sohio Western Mining Company, Attention: James D. Copen, Building 1, Suite 300, 6325 East Tennessee Avenue, Denver, Colorado 80224, and the Bureau of Land Management, Wyoming State Office, Attention: Lands and Mining Section, P.O. Box 1828, Cheyenne, Wyoming 82001.

The foregoing notice is published in the Federal Register pursuant to Title 43 of the Code of the Federal Regulations, § 3410.2-1(d)(1).

Harold G. Stinchcomb,

Chief, Branch of Lands and Minerals Operations.

[FR Doc. 81-1467 Filed 1-14-81; 8:45 am]

BILLING CODE 4310-84-M

[W-73268]

Wyoming; Invitation for Coal Exploration License; Sunoco Energy Development Company

January 5, 1981.

Sunoco Energy Development Company hereby invites all interested parties to participate on a pro rata cost sharing basis in its coal exploration program concerning Federally owned coal underlying the following-described land in Campbell County, Wyoming:

Sixth Principal Meridian, Wyoming

T. 47 N., R. 71 W.,
  Sec. 19, Lots 1–4, E½, and E½W½ (All);
  Sec. 20, All;
  Sec. 21, All;
  Sec. 28, All;
  Sec. 29, All;
  Sec. 30, Lots 1–4, E½, and E½W½ (All);
  Sec. 31, Lots 1–4, E½, and E½W½ (All);
  Sec. 32, All;
  Sec. 33, All.
T. 47 N., R. 72 W.,
  Sec. 24, All;
  Sec. 25, E½, E½W½, and NW¼NW¼.
  Containing 6,901.65 acres.

All of the coal in the above lands consists of unleased Federal coal within the Powder River Basin known recoverable coal resource area. The purpose of the exploration program is to determine the quality and quantity of the coal, to analyze the character of the overlying rock, and conduct surveying and surface geologic mapping within the boundaries of the above-described area.

A detailed description of the proposed drilling program is available for review during normal business hours in the following offices (under Serial Number W-73268): Bureau of Land Management, 2515 Warren Avenue, Cheyenne, Wyoming 82001, and the Bureau of Land Management, 951 Rancho Road, Casper, Wyoming 82601.

This notice of invitation will be published in this newspaper once each

4340 SOIL, WATER, AND AIR

INTRODUCTION

The 4340 subactivity as administered by the BLM includes management of soil, water, and air resources. For the purposes of this MSA, soil and water management are discussed together, and air quality management is discussed separately. Page headers direct the reader to the two separate sections within this chapter.

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Hazardous and Sensitive Watershed Areas.

RESOURCE OVERVIEW

Watershed resources consist of the interaction between water and soils (cross-reference: Soils and Water, Part I). Watershed condition is measured in terms of water quality. In the Colorado River Basin, sedimentation and salinity are the primary factors that affect water quality.

Salinity in the SJRA is part of a regional issue facing the states in the Colorado River Basin. The SJRA lies within the Utah portion of the upper drainage basin (see Watershed Areas overlay, Water, Part I). The upper drainage basin is composed of all lands draining into the Colorado system above Lees Ferry, Arizona. It is estimated that the upper basin contributes 72 percent of the salinity to the lower basin. Of this amount, 52 percent is believed to come from public lands.

During low flow periods, most of the salt contribution comes from seeps, springs, and ground water flow through deep channels. For the upper basin, this is estimated as being 3,000 to 5,000 mg/l. During precipitation events, most salts are picked up in drainage channels where a flow volume increases. It is estimated that overland flow across the soil surface picks up less than 5 percent of the soluble salts. Salt yield from drainage channels can be as much as 30 tons per acre in highly saline areas. It is estimated to average 0.05 tons per acre per year for these areas.

The greatest total quantity of salts is believed to come from areas with more than 12 inches of rainfall per year. While soils in these areas are generally nonsaline to slightly saline, they contribute far more runoff to the upper basin than do the drier areas. The greatest contribution of salts from desert and semidesert areas comes from alluvial deposits.

In these drier areas, overland flow carries the salts to the alluvial soils in the drainage channels. This is particularly true of sensitive areas that contain slightly saline to saline soils that are silty and clayey. Heavy use on these soils when they are wet causes compaction, which reduces the infiltration rate and thereby increases runoff, overland flow, and streamflow. This, in turn, causes more streambank erosion and increases the salt and sediment load carried by the drainage channels (summary of BLM 1977 status report; USU experiment station report, 1975; BLM 1978-1979 status report).

The salt load in the lower reaches of the upper Colorado River Basin is estimated at 600 to 700 p/m, without considering the effects of human activities. In 1975, average levels were about 850 p/m (USU Experiment Station, 1974).

Saline geologic formations or saline soils in the SJRA are less extensive than in adjacent resource areas. Major salt bearing formations found in the area include the Moenkopi, Chinle, Carmel, and Morrison (cross-reference: Geology, Part I). Soils formed of material from these formations and alluvium downstream are slightly to strongly saline. Total acreage of both these alluvial and residual soils in the SJRA is about 70,000 acres (about 4 percent of the resource area). Of this, about 6,000 acres are alluvial soils, and about 64,000 acres are soils formed in residuum. There are also about 19,000 acres of badland and gypsumland.

About 45,000 acres are soils that can be classified as sensitive. These sensitive soils are erodible and are subject to compaction when wet. They can be expected to contribute salt and sediment to the drainage system when disturbed. Acreage and erosion rates for these soils are shown in table 4340-1.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

National Laws

The Economy Act of 1932, as amended, forms the basis for agreements between BLM and SCS concerning soil survey work and between BLM and USGS for certain stream monitoring activities.

The Taylor Grazing Act of 1934, as amended, provides for continued study of erosion and flood control and for any work that may be necessary to protect and rehabilitate the public lands in order to prevent soil deterioration.

The Soil Conservation and Domestic Allotment Act of 1935, as amended, authorizes the BLM, through Reorganization Plan IV and Secretarial Order 2835, to conduct and publish surveys, investigations, and research relating to the character of soil erosion; to disseminate information on erosion prevention measures; and to conduct demonstration projects in areas subject to wind and water erosion. The act further provides for the preservation and improvement of soil fertility, promotion of the economic use and conservation of land, and diminution of exploitation and wasteful and unscientific use of national soil resources.

The Appropriations Act of 1952, McCarran Amendment, allows the U. S. to be joined as a defendant in any suit for the general adjudication of water rights.

TABLE 4340-1

Salt and Sediment Estimates from Disturbed Sensitive Soils

Soils	Acres	Erosion Rates (tons/acre/year)	Salt Yield (mg/l)
Bodot soils	5,000	15	500
Littlenan soils	30,000	10	1,000
Recapture soils	3,000	2	1,000
Robroost family	7,000	15	1,000

The Watershed Protection and Flood Control Act of 1954, as amended, directs the Federal Government to cooperate with states and their political subdivisions, soil or water conservation districts, flood prevention or control districts, and other local public agencies to prevent erosion or flood water and sediment damage.

The Water Resources Research Act of 1954, as amended, permits the Secretary of the Interior to give grants to, and cooperate with, federal, state, and local agencies to undertake research into any water problems related to the mission of the Department.

The Water Resources Planning Act of 1965, as amended, establishes the Water Resources Council, which is directed to maintain studies of water supplies and water programs. The chairman of any river basin commission can request from an agency, and that agency is authorized to furnish, such information as is necessary to carry out its functions.

The Federal Water Pollution Control Act with Amendments, 1972, has the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Section 208 provides for preparation of water quality management plans. The Clean Water Act of 1977 provides additional authorizations.

The Water Resources Development Act of 1974 directs agencies to consider the full range of potentially useful measures in all projects involving reduction of flood losses.

The Colorado River Basin Salinity Control Act of 1974 directs the Department of the Interior to undertake research and develop demonstration projects to identify methods to improve the water quality of the Colorado River.

SMCRA of 1977 requires hydrologic information for permits for mining development and requires federal agencies to gather hydrologic data to ascertain the suitability for mining.

The Safe Drinking Water Act of 1977 protects all public water systems (and their surface and ground water areas) from pollutants or contaminants that would endanger public health and welfare. Activities on public lands in these watersheds must not cause contaminant levels to exceed promulgated standards.

Executive Orders

EO 11288, July 2, 1966, requires the heads of agencies to provide leadership in the field of water quality management, and requires that federal facilities develop pollution abatement plans.

EO 11738, September 10, 1973, directs each federal agency to enforce the Clean Air Act and the Clean Water Act in the procurement of goods, materials, and services.

EO 11752, December 17, 1973, mandates that federal agencies shall provide national leadership to protect and enhance the quality of air, water, and land resources through compliance with applicable federal, state, interstate, and local pollution standards. This order cross-references the need to comply with several environmental acts such as the Clean Air Act, Federal Water Pollution Control Act, Solid Waste Act, Noise Control Act, insecticide and pesticide acts, and NEPA.

EO 11988, May 24, 1977, Floodplain Management, as amended by EO 12148, directs each federal agency to take action to avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are further required to avoid direct or indirect support of floodplain development whenever there is a practicable alternative.

EO 11990, May 24, 1977, Protection of Wetlands, directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial value of wetlands in carrying out programs affecting land use.

EO 12088, Federal Compliance with Pollution Control Standards, October 24, 1978, requires all federal agencies to comply with local standards and limitations relating to water quality. As a wastewater management agency, each federal agency is bound to recognize and adopt the policies, goals, and standards of approved Section 208 areawide water quality management plans in regard to those federal lands under its jurisdiction and to implement the standards of the plans to the maximum extent feasible in its own planning process and management activities.

EO 12322, September 17, 1981, requires that any report, proposal, or plan relating to a federal or federally assisted water and related land resources project or program must be submitted to the Director, OMB, before submission to Congress.

The U.S. Water Resource Council published Floodplain Guidelines on February 10, 1978 after being directed to establish guidelines for floodplain management and preservation.

Circulars

OMB Circular A-67 (August 28, 1964) provides guidelines for coordination of water data activities and states that the USGS shall acquire basic data on the nation's water resources. It further states that other agencies shall acquire special water data in support of their respective missions and that these activities must be closely coordinated to assure effective and economical management of resources.

Circular A-81, Reporting Requirements in Connection with Prevention, Control, and Abatement of Water Pollution: Existing Federal Facilities, requires federal agencies to:

(1) meet water quality standards and related plans which states have developed under the Federal Water Pollution Control Act;

(2) consult with the Secretary of the Interior at the earliest feasible time to determine standards applicable to particular facilities and otherwise cooperate with him/her; and

(3) cooperate with state and local pollution control agencies and with other federal agencies in the evaluation of their pollution control needs.

Circular A-97, Specialized and Technical Services to State and Local Governments, sets forth rules and regulations to effect Title III of the Intergovernmental Cooperation Act authorizing federal agencies to provide reimbursible technical services to state and local governments.

Bureau Manuals

6740	Establishes policy and procedures for the identification, protection, maintenance, and management of fresh, brackish, and saline waters wetland areas.
7100	Defines the policy of BLM's Soil Resource Management Program.
7120	Provides guidelines for maintaining all Bureau watershed improvements constructed on public lands.
7150	Provides guidance in the conduct and maintenance of water utilization and development, water quality, water yield and timing, and water rights.
7160	Provides general guidance for preventing water and wind erosion.
7180	Relates the restoration of disturbed areas directly to policy on erosion control, protection, maintenance of quality of the environment, rehabilitation of mined lands (BLM 3509 and 3605), and prevention of erosion in road construction, etc.
7210	Provides the basic framework for the soil and watershed activity.
7221	Describes the policies, responsibilities, and procedures used to incorporate floodplain management into all Bureau activities.
7240	Describes Bureau policy to protect, maintain, restore, and enhance the quality of water on public lands so that its utility for other dependent ecosystems will be maintained equal to or above legal water quality criteria.
7250	Establishes policy and guidance for acquiring, perfecting, and protecting water rights necessary for multiple use management
7315 to 7317	Provides procedures for inventory and analysis of ground and surface water inventories and of erosion and sediment reduction.

7322 Provides procedures for analyzing watershed problems and developing plans for improving watershed conditions.

7410 Provides criteria, standards, and techniques for land treatment. Objectives are to:

- control rate of overland and channel flow, water and wind erosion, and resultant soil losses;
- improve soil development, infiltration rates, etc.;
- improve quality and quantity of renewable resources; and
- protect onsite and offsite values from sediment and flood damages.

Instruction Memorandums

78-410 Sets BLM policy on protection of wetlands and riparian areas.

78-523 (and 78-523, Change 1) Compliance with BLM Interim Floodplain Management Procedures.

Applicable Utah State Regulations

State of Utah, Department of Health, Division of Environmental Health; Wastewater Disposal Regulations.

(a) Part II: Standards of Quality for Waters of the State; as amended by the Utah Water Pollution Control Committee; June 23, 1983. This regulation defines minimum standards of water quality for waters in the various use classes and recognizes salinity standards for the Colorado River Basin as agreed to by the Colorado River Compact States and EPA.

(b) Part V: Small Underground Wastewater Disposal Systems; as adopted February 5, 1984. This regulation provides the requirements for approval of small wastewater treatment systems and their design.

(c) Part VI: Surface Disposal of Produced Water from Oil and Gas Wells, as adopted January 20, 1982. This regulation defines rules governing the disposal of produced water from oil and gas wells.

RESOURCE ALLOCATIONS

Water use is allocated through water rights governed by the state. The use of soils is not directly allocated, but is an inherent part of any land development activity. No other allocations of resources apply to watershed management.

Rights covering present water uses in the SJRA have been established in accordance with state law. While details of appropriation procedures differ somewhat in Utah and Colorado, the water laws have similar intents and objectives.

As is commonly the case in the Western States, the cumulative rights of the water users generally cover more water than flows naturally in the source. This condition has been permitted to develop so that even the highest streamflows, usually of short duration, can be distributed to the users according to their rights, if the water can be used beneficially. Distribution is made under the rule that first in time is first in right. As streamflows recede, diversions to the appropriators are cut off in order of priorities. Water distribution is usually supervised by a watermaster employed by the water users.

Although water in the SJRA has been fully appropriated, it has not been fully developed. Therefore, opportunities exist for temporary use of undeveloped water. These opportunities are limited, however, since the major sources of surface flow from the Abajo Mountains are fully appropriated, as are all major sources of ground water. A few sources of surface flow are appropriated but not yet developed. Any future permanent appropriation and development of surface water or ground water will be limited to stock watering, single household use, or irrigation of 0.25 acre of land or less.

The San Juan Water Conservancy District sponsored a bill that would allow fixed time approvals for use of appropriated yet undeveloped water. This bill (Senate Bill 198) has received overwhelming approval and, as of March 13, 1985, awaits only the Governor's signature to make it law. Under the new legislation, developers and irrigators could receive the right to use water that will be available until the water right holder develops the water source.

Currently, time extensions for development of a water right are allowed for up to 14 years without possibility for protest, and then up to 50 years with periodic review that includes readvertising the right, making it susceptible to protest. With the lengthy extensions possible, much of Utah's appropriated water is passing through the state without being used. Senate Bill 198 would give the state more flexibility in using these water sources, which include ground water sources where available.

Any potential water consuming development in the area must be considered in the light of the right of the state in which it is located to further deplete the flow of the Colorado River. The waters of the river were divided between the Upper and Lower Colorado River Basins by the Colorado River Compact of 1922. Depletion allowances made to the Upper Basin were apportioned among the Upper Basin States, including Utah and Colorado, by the Upper Colorado River Compact of 1948. All known potentialities for water resource developments in these two states cannot be consummated within the states' allowable depletion. State authorities will no doubt influence the selection of projects for development that can best utilize the remaining water supply.

The RMP cannot determine water rights, but it may be used as a basis to develop future uses for water or soils in the SJRA.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

The major concerns of watershed management in the SJRA are related to (1) the amount of sediment and salt introduced into the drainage system and (2) the levels of TDS and other chemical substances, including soluble salts, in the waters of the area (cross-reference: Soils and Water, Part I).

A major source of sediment and associated salts in the SJRA is erosion on public lands. Most of this is natural or resulting from relatively stable conditions in a semiarid or arid climate regime with periodic high intensity storms (cross-reference: Climate, Part I). Badland and gypsumland are natural sources of both sediment and salt. Other areas are stabilized by vegetative cover, including cryptogamic cover in the soil surface or a surface cover of rock fragments (cross-reference: Vegetation, Part I). Surface disturbance, to the extent that it destroys this cover, increases the amount of soil lost through erosion.

Some of the sediment and salt lost from a site is carried into the drainages and then directly into the Colorado River, Lake Powell, or the San Juan River. A portion is simply carried downslope or deposited in part of the intermittent drainage system.

The majority of salt and sediment carried into Lake Powell or the San Juan and Colorado Rivers is actually from the drainages. Peak runoff events from high-intensity storms contribute the greatest volume of salt and sediment.

Salt and sediment yield is of major concern in the Colorado River Basin. The Colorado River Basin Compact States have adopted numeric salinity criteria for the Basin. These criteria for stations downstream from the SJRA are shown in table 4340-2. Beyond these, no criteria have been set, either by the State of Utah or by federal agencies with land management responsibility in or near the SJRA.

The State of Utah, in Wastewater Disposal Regulations, Part II, Standards of Quality for Waters of the State, recognizes these values and any other values that may be approved by the seven Colorado River Basin states in conjunction with EPA. In addition, Arizona has promulgated water quality standards through EPA on the Colorado River at the Utah state line to limit the amount of total phosphates and nitrates (40 CFR 131.31). The San Juan River flowing into Lake Powell may on occasion exceed these values.

The State of Utah has also set water quality standards that apply to some waters within the SJRA. Table 4340-3 lists these waters and the use classes that apply. The use classes are defined as follows (Wastewater Disposal Regulations, Part II):

Class 1C	Protected for domestic purposes with prior treatment by standard complete treatment processes as required by Utah State Division of Health.
Class 2A	Protected for recreational bathing (swimming).

TABLE 4340-2

Colorado River Basin Numeric Salinity Criteria

Location	Salinity in mg/l
Below Hoover Dam	723
Below Parker Dam	747
Imperial Dam	879

Source: Colorado River Basin Compact.

TABLE 4340-3

State Water Classifications

	Use Classes							
	Domestic Source	Recreation and Aesthetics		Aquatic		Wildlife		Agriculture
	1C	2A	2B	3A	3B	3C	3D	4
UPPER COLORADO RIVER BASIN								
COLORADO RIVER DRAINAGE								
San Juan River and tributaries, from Lake Powell to state line except as listed below:	X		X		X			X
Johnson Creek and tributaries, from confluence with Recapture Creek to headwaters	X			X				
Verdure Creek and tributaries, from Highway U-47 crossing to headwaters				X				X
North Creek and tributaries, from confluence with Montezuma Creek to headwaters	X			X				X
South Creek and tributaries, from confluence with Montezuma Creek to headwaters				X				X
Spring Creek and tributaries, from confluence with Vega Creek to headwaters				X				X
Montezuma Creek and tributaries, upstream from Monticello	X			X				X
Colorado River, from Lake Powell to state line	X		X		X			X
Indian Creek and tributaries, from confluence with Colorado River to Indian Creek State Park					X			X
Indian Creek and tributaries, through Indian Creek State Park to headwaters				X				X

Class 2B	Protected for boating, water skiing, and similar uses, excluding recreational bathing.
Class 3A	Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
Class 3B	Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
Class 3C	Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain. Standards for this class are determined on a case-by-case basis.
Class 3D	Protected for waterfowl, shore birds, and other water oriented wildlife not included in classes 3A, 3B, or 3C, including the necessary organisms in their food chain.
Class 4	Protected for agricultural uses including irrigation of crops and stock watering.

A plan of implementation for the Colorado River System has been recommended, which provides for cost-effective salinity control measures by the BLM to reduce salt contribution from public domain lands. Proposed projects will need to be evaluated on their cost relative to their effect on salt and sediment yield to the drainage system.

There are currently (1984) no proposed projects for salinity control in the SJRA. The BOR is involved with several measures to reduce levels of salinity in the upper basin. The nearest projects have been proposed on McElmo Creek (south of the SJRA) to control irrigation return flow, and on the Dirty Devil system (northwest of the SJRA). The main tools for controlling sediment and salt yields in the SJRA will be management actions or small-scale projects on sensitive lands that would meet needs of other programs.

The actual contribution of salt and sediment yield to the Colorado River Basin from drainages in the SJRA is unknown. However, the resource area does contain approximately 17,000 acres of badland; 2,000 acres of gypsumland; and 70,000 acres of saline soils. The soils that are slightly or moderately saline are potential sources of additional salts and sediment when they are disturbed. Erosion rates for these areas when disturbed can be expected to approach 10 tons per acre per year (table 4340-1). Appendix 4340-A explains the estimation of soil loss.

About 19,000 acres of SJRA area lands are composed of badland or gypsumland. These areas are natural sources of salt and sediment to the Colorado River system. Present losses of sediment are estimated at 5 to 50 tons per acre per year. These areas are highly dissected with steep slopes and intricate drainage patterns. They are little utilized by livestock because of the lack of forage and the steep, complex terrain. Surface disturbance in these areas could increase the loss rates to 10 to 75 tons per acre per year.

Also in the resource area are 754,918 acres of soil types highly susceptible to water erosion when disturbed. These are soils that have a high content of very fine sand- and silt-sized particles. Some of the soils are slightly saline. Under good vegetative cover these soils can be expected to lose less than 1 ton per acre per year. Under poor cover, soil loss can be expected to approach 5 tons per acre per year. When these soils are disturbed, soil loss could approach 10 tons per acre per year.

In the SJRA, there are about 45,000 acres of soils that are erodible and sensitive to compaction. They have a relatively high clay content, high silt content, and are generally slightly to moderately saline. When wet, they are subject to compaction, which reduces infiltration, increases runoff, and therefore increases erosional forces off the land. Heavy grazing pressure or surface disturbance on these sensitive areas can increase both the salt and sediment loading to the Colorado Basin. Soil loss from disturbed areas could approach 15 tons per acre per year. Salt contribution could approach 0.05 tons per acre per year.

Besides water erosion, many of the soils in the SJRA have formed in aeolian material and have a high percentage of fine sand-sized particles. They are subject to wind action, and surface disturbance on several acres can result in soil loss of over 20 tons per acre.

Due to the nature of runoff events, the period and amount of runoff is highly variable. One or several high-intensity storms can bring drainages and dry washes to flood stage. Flood damage has been reported (Butler and Marsell, 1972) for the period between 1939 and 1969. This report deals primarily with damages in towns. The structures most often affected by peak runoff events on public lands are water (erosion) control structures, stock ponds, and roads (both paved and dirt), which often follow canyon floors and cross stream channels.

Under EO 11988 (May 24, 1977) as amended by EO 12148, federal agencies are required to avoid long- or short-term impacts from development on floodplains. Floodplains are not extensive in the SJRA, even considering dry washes. Sizable areas for floodplains have been mapped out at a scale of 1:24,0000 on the soil maps. These map units are described in table 4340-4. Floodplains are also shown on the Hazardous and Sensitive Watershed Areas overlay. About 55,000 acres are recognized as occurring in floodplains subject to 100-year floods. Smaller washes can be expected to be in flood during any intense local storms.

The SCS is working on demonstration projects on the agricultural land near Montezuma Creek to control runoff and erosion. These projects include use of terraces, contour furrows, and grassed waterways.

TABLE 4340-4

Soil Map Units Subject to Flooding

Map Symbol	Name
KBA	Barnum loam, 0 to 3 percent slopes
KAA	Barnum silty clay loam, 0 to 3 percent slopes
LAA	Redbank fine sandy loam 0 to 3 percent slopes
LbA	Redbank very fine sandy loam, 0 to 3 percent slopes
McC	Trail fine sand, 0 to 5 percent slopes
FL	Ustic torrifluvents - Ustic torrifluvents, sodic - Typic ustifluvents Complex
3	Bankard family - Riverwash Complex
4	Bankard family - Sheppard Complex
15	Green River - Bankard families - Riverwash Association
42	Recapture - Redbank family - Bankard family Association
43	Redbank family - Riverwash - Green River family Association

The SJRA is in the process of filing water rights in three adjudication areas with the State of Utah (cross-reference: Wildlife Habitat Management, Part II). Filings are for both livestock and wildlife uses, although the state does not recognize water rights for wildlife. Any conflict with other users should be identified in the adjudication process.

The four MFPs do not address watershed concerns, although some water related range improvements are suggested.

SOCIOECONOMIC CONSIDERATIONS

Except for the discussion of downstream costs of salinity introduced into the Colorado River, this section concentrates on San Juan County, which is the primary impact area. For a more complete explanation of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

Water in the SJRA is currently used for agricultural, industrial, residential, and recreational uses. Total water use in San Juan County is 65,000 acre-feet per year, the large majority of which is used in agriculture (Battelle Memorial Institute, 1982).

Most other local industries also require water. Therefore, most economic activity in the county depends to some degree on the availability of water. However, the importance of water relative to other inputs is generally lower for these other industries than for agriculture. The other industries most dependent on water include mining, construction, and tourism.

Municipal water is used either directly by households or indirectly for community developments. Including these direct and indirect needs, municipal water use averages 150 to 200 gallons per person per day.

Salinity and sedimentation are the major watershed related concerns.

At its headwaters in the mountains of central Colorado, the Colorado River has a salinity level of only about 50 mg/l TDS. The river's salinity content increases progressively downstream because of diversions and salt contributions from a variety of sources, such as the saline land it drains. In 1983, salinity averaged 710 mg/l at Imperial Dam, the last major diversion point in the U.S. Without any control measures in combination with future development in the Colorado River Basin, the BOR estimates that concentration will continue to increase, reaching levels of 1,089 mg/l at Imperial Dam by the year 2010.

The salinity level of the Colorado River results from two general causes: salt loading and salt concentration. Salt loading is the addition of salt to the river; salt concentration results from consumptive uses that reduce the volume of water without reducing the total salt carried.

While salinity generally is not a problem in San Juan County, salt loading and salt concentrating from the SJRA affect water users in the Lower Colorado River Basin. For municipal and industrial users downstream, higher salt concentrations increase water treatment costs, pipe corrosion, appliance wear, and soap and detergent needs, while decreasing water palatability. For those who irrigate, the higher salt concentrations cause decreased crop yields, loss of productive land, increased leaching and draining needs, and increased management costs, sometimes making it necessary to change to a more salt-tolerant crop.

Several studies (Kleinman, et al., 1974; Kleinman and Brown, 1980; BOR, 1980) have attempted to quantify the downstream user cost of increasing salinity levels in the Colorado River. The summary findings presented in table 4340-5 give downstream user costs of an increased saline concentration at Imperial Dam of 1 mg/l. The agricultural cost of a 1 mg/l increase in salinity increases as the salinity level increases, whereas the municipal and industrial cost per 1 mg/l increase remains stable.

The BOR updates these figures using GNP price deflators along with projected baseline salinity levels to estimate impacts of salinity control and water development projects (see table 4340-6).

The BOR also establishes procedures for quantifying the change in salt concentrations at Imperial Dam given a change in salt loading or water yield in the Upper Colorado River Basin (see table 4340-7).

The two major deficiencies with the BOR estimates is that they do not account for all salinity costs and that they include indirect costs which, under conditions of capital and labor mobility, should not be included in an efficiency analysis.

The use of many capital investments including streets, buildings, sewers, reservoirs, and irrigation ditches, can be severely hampered with sediment. Either the sediment has to be removed to regain use of the capital investment, or the use of the capital investment will deteriorate over time. Table 4340-8 presents the cost of removing sediment from streets, buildings, sewers, and reservoirs.

Sedimentation can also be costly to culinary water users. Communities with simple filtration and chlorination systems can handle peak sediment loads of 10 to 15 mg/l. The increased cost of using a coagulation filtration system, which can handle a wide range of sediment loads, depends upon treatment plant size. For service areas of less than 25,000 people, the increased cost would vary from $15 to $30 per person served (see table 4340-9). Increased sedimentation also increases the amount of sludge needing to be removed from water treatment plants. These costs appear to vary by plant size; however, the average costs have been reported to be $20 per day.

Sedimentation has not affected local economic activity. None of the culinary water systems in San Juan County have a problem with sedimentation. Except in small, isolated cases, sedimentation of capital investments has not been a problem. Livestock reservoirs in high erosion areas and sedimentation of Lake

TABLE 4340-5

Summary of Total Annual Cost per mg/l Increased Salt Concentration at Imperial Dam with Varying Levels of Salinity (in 1976 dollars)

TDS (mg/L)	Agricultural impacts		Municipal costs	Total impacts	
	Profit loss	Regional income loss		Direct	Direct and indirect
800	$3,799	$20,211	$240 500	$244,299	$264,510
825	4,326	23,014		244,826	267,840
850	4,925	26,201		245,425	271,626
875	5,608	29,835		246,108	275,943
900	6,385	33,968		246,885	280,853
925	7,270	38,676		247,770	286,446
950	8,277	44,034		248,777	292,811
975	9,424	50,136		249,924	300,060
1000	10,730	57,084		251,230	308,314
1025	12,217	64,994		252,717	317,711
1050	13,910	74,001		254,410	328,411
1075	15,838	84,258		256,338	340,596
1100	18,033	95,936		258,533	354,469

Source: Kleinman and Brown, 1980.

TABLE 4340-6

Estimated Impact of Increasing Salinity at Imperial Dam by 1 mg/l

Dollar Year	GNP Implicit Price Deflator	Direct Incremental Impact	Indirect Incremental Impact	Total Incremental Impact
1976	133.7	$257,300	$ 85,700	$343,000
1977	141.7	272,600	90,900	363,500
1978	152.0	292,425	97,475	389.900
1979	165.5	318,500	106,100	424,600
1980	174.5	335,800	111,900	447,700
1981	185.1	356,000	119,000	475,000
1982	201.7	388,000	129,000	517,000
1983	210.3	405,000	135,000	540,000
1984	218.2	420,000	140,000	560,000
1985	226.1	435,000	145,000	580,000

Source: Kleinman and Brown, 1980; BOR, 1985.

TABLE 4340-7

Procedures for Converting Changes in Salt Loading and Water Yield to Salt Concentrations at Imperial Dam

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$$\text{Year 1990:}\quad \text{mg/l} = \left[\left[6{,}630\left(\frac{9{,}710 + X}{8{,}129 + Y}\right)\right] - 7{,}919.5\right] \times 0.1306$$

$$\text{Year 2000:}\quad \text{mg/l} = \left[\left[6{,}627\left(\frac{9{,}655 + X}{7{,}509 + Y}\right)\right] - 8{,}529.8\right] \times 0.1310$$

NOTE: X = salt loading in tons; Y = water yield in acre-feet;
mg/l = salinity change at Imperial Dam in milligrams per litre.

Source: BOR, 1982.

TABLE 4340-8

Sediment Removal Cost and Capital Investment Depreciation (1984 dollars)

Streets	$ 13	to	16	per ton
Buildings	140	to	150	per ton
Sewers	250	to	300	per ton
Reservoirs and ditches				
offsite removal	1.80	to	4.80	per ton
onsite removal	1.10		1.50	per ton
Lake Powell[a]	0.03	to	0.06	per ton

[a] The figures for Lake Powell do not represent sediment removal costs, but rather the gradual deterioration of electrical, recreational, water storage, and flood control benefits generated by Lake Powell.

Sources: BLM records; USFS, 1979; EPA, 1973.

TABLE 4340-9

Increased Treatment Costs When Filtration Systems Reach Threshold Sediment Loads of 10-15 mg/L (1984 dollars)

Population Size	Average Annual per Capita Cost of Converting from Filtration Treatment to Coagulation Treatment	Tons of Sediment	Average Sludge Removal Cost
2,000	$30.30	200	$ 800
5,000	28.00	400	1,600
10,000	24.30	600	2,400
		800	3,200
		1000	4,000

Source: EPA, 1973.

Powell are existing problems; however, it is not possible to quantify the cost of sediment originating from public lands in the SJRA.

Some of the governmental costs related to managing watershed resources within the SJRA contribute to local sales and therefore to income and employment. These local governmental expenditures generate an estimated 1.1 jobs and $17,808 of personal income (see table 4340-10).

The watershed resource affects the revenues and costs of local taxing jurisdictions only insofar as the watershed resource affects other economic activities. Because the relationship between the watershed resource and economic activities cannot be quantified, the local fiscal effects of the resource cannot be quantified.

CONSISTENCY WITH NON-BUREAU PLANS

The Southeastern Utah Association of Governments has been involved in preparing Section 208 water quality management plans under the Water Pollution Control Act. Plans have been completed for the Montezuma Creek Subbasin (1981) and Recapture Creek Subbasin (1981). These plans set up cooperative management of watersheds under several federal, state, and local government entities, including BLM. Current management is consistent with these plans.

DATA GAPS

The following data gaps have been identified:

1. Deeply incised stream channels in the resource area are areas of high stream bank erosion. Headcuts from these drainage channels can be expected to advance upstream with subsequent loss of riparian areas and vegetative cover and increased sediment loss from the area. Little information is available on the location and length of these stream channels. Estimated work requirements: 2 to 3 work months to locate and map. Some channel cross-sections should be prepared on the major ones.

2. Locations of BLM structures damaged by floods, including stock ponds, erosion control structures, and cattleguards. Estimated work requirements: 2 to 3 work months.

3. Water quality and quantity data are continually inadequate. Filling the gap would require coordination with USGS and State of Utah to locate data collection stations and gather the data.

4. Quantification of amounts and extent of water being used for irrigation.

5. Quantitative appraisals of regional and local aquifer systems, including water quality, depth, and flow rate; and of aquifer characteristics such as transmissivity, storativity, and hydraulic conductivity.

TABLE 4340-10

Local Importance of the SJRA Watershed Program Related Costs (1984 fiscal year, in 1982 first quarter dollars)

Industrial Sector	Estimated Cost of the Program	Local Effect	
		Income	Employment
Public Administration	$28,338	$14,375	0.9
Other Sectors[a]		3,433	0.2
Total	$28,338	$17,808	1.1

[a] Includes the direct, indirect, and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

Source: BLM Records; USFS, 1982.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

Demand is the amount of a good or service that users are willing to take at a specified price, time period, and condition of sale. The price of water is reflected by the cost of obtaining water rights and the cost of delivering water when and where it is needed. Under existing market conditions, the quantity of water demanded in the San Juan County is estimated to be 65,000 acre-feet per year (Battelle Memorial Institute, 1982). Agriculture accounts for the large majority of this use, with municipal and industrial uses accounting for the remainder. The most accurate assessment of present demand will be in a report entitled Hydrologic Inventory of Utah's Southeastern Colorado River Basin, expected to be published by the Utah Division of Water Resources in 1987.

The BOR (1969) studied the feasibility of developing water projects in the general area. Of the seven projects examined in or near the SJRA, only Recapture Dam has gone through to development. It will provide supplemental irrigation water for about 2,300 acres. Little or no water is available to be appropriated for irrigation development.

Part of the watershed for Recapture Dam is public lands. The water impoundment and the portion of Recapture Creek upstream will probably be identified as class 1C, or protected for domestic purposes with prior treatment. The communities in the SJRA (other than Mexican Hat) draw their water from wells. Activities that affect either the recharge areas or the aquifers used by these communities are mainly mineral or oil and gas development. The dams currently undergoing construction near Blanding and Monticello (cross-reference: Water, Part I) should provide an adequate water supply for the near future.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

The demand for water is expected to grow in proportion to local agricultural and population growth. Battelle Memorial Institute (1982) has projected future water use to increase from 65,000 acre-feet to 380,000,000 acre-feet by the year 2000. This projection was based on major new irrigated agricultural developments around the San Juan River. There are presently no plans for such large-scale agricultural developments.

Employment in the southeastern district's agricultural sector (Carbon, Emery, Grand, and San Juan Counties) is projected to decline by 0.9 percent a year, a 14 percent decline by the year 2000 (Utah, 1985). However, because agricultural productivity will increase, agricultural output from the southeastern district will remain static. Agricultural water use will probably change in proportion to total sector growth. Because changes to both the southeastern district's and San Juan County's agricultural sectors should be similar, San Juan County's total agricultural output and water use should remain static.

San Juan County's population is projected to grow at an annual rate of 1.1 percent, an 18 percent increase by the year 2000 (Utah, 1985). Municipal and industrial demands should increase at the same rate as population growth. However, municipal and industrial water use accounts for only a small portion of total use, and the total local demand for water should grow only slightly.

Most surface waters available to agriculture have been appropriated. Therefore, future agricultural water use could increase only if additional waters could be appropriated and developed at a cost that permits economical use for irrigation. The future ability to appropriate and develop water economically is highly dependent on both state water laws and water development subsidies. Neither of these use-determining factors can be projected into the future.

CRITICAL THRESHOLDS

A critical threshold regarding salinity of the Colorado River would be reached if management actions in SJRA resulted in river salinity levels exceeding the salinity criteria established by the Colorado River Basin Compact States (see table 4340-2).

If management actions within the SJRA allowed surface disturbing activities that resulted in a cumulative increase in sedimentation or salinity, a significant change could occur. Surface disturbing activities could increase sediment rates from 10 to 75 tons per acre per year, with a concomitant increase in salt yield. This represents a critical threshold.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current management has been generally adequate in controlling sediment and salt in drainages within the SJRA.

The extent to which state water classes are being maintained along the segments of streams or bodies of water listed in table 4340-3 is unknown. Some specific problems have been noted.

Springs in Bucket Canyon between Recapture Creek and Montezuma Creek in T. 40 S., R. 23 E., show abnormally high values for chlorides and calcium. This canyon is in an allotment with a limited number of stock water sources. The livestock permittee has voiced concern over the quality of water available. The spring is near a saline water injection point for oil and gas wells. Samples from the injection water and the spring indicate that the injection water may be the source of the problem (see Appendix 4340-B at the end of this chapter). USGS has also expressed concern over the quality of water coming from the Navajo aquifer. At present (1985), research is under way to define the problem. This aquifer is a possible source of drinking water for Bluff.

A continuing concern in the resource area is developing water supplies for livestock watering or wildlife (cross-reference: Grazing Management and Wildlife Habitat Management, Part II).

Major drainages in the resource area show considerable downcutting, which has probably occurred within the last 100 years. This is evident in Montezuma Creek, Cottonwood Wash, Butler Wash, Comb Wash, and Indian Creek. Some of this downcutting may be the result of increased runoff from agricultural practices, as well as areas with heavy past use. It may also be due to changing climatic patterns with more frequent, intense, localized storms.

Downcutting and erosion of the streambank in Montezuma Creek has threatened archaeological sites, the county road, and some irrigated cropland. It has destroyed one dam. The drainage basin drains an extensive area under dryland crops around Monticello and Bluff, and some chained areas.

Certain management practices are resulting in an irreversible or irretrievable commitment of resources.

Soils in floodplains or with a high seasonal water table represent about 55,000 acres (about 3 percent) of the SJRA. Virtually all the soils with a high seasonal water table in the SJRA are on floodplains located primarily along the San Juan River. The irretrievable commitment of resources is related to the loss of structures built on floodplains or to the contamination of surface or ground waters from development on the floodplain.

Areas of slightly saline soils or of exposed geologic formations high in salt represent about 89,000 acres (about 4 percent) of the SJRA. The irretrievable commitment of resources includes salt and sediment yield to the drainage basin and loss of vegetation on saline soils with continued high erosion rates.

About 42 percent of the SJRA contains soils with high potential erosion rates from wind or water. About 7 percent are subject to severe wind erosion when disturbed, and about 35 percent are subject to severe water erosion when disturbed. The irreversible or irretrievable commitment of resources includes both the soil lost and the loss in vegetation productivity of the soils. The amount of soil loss could be expected to approach 15 tons per acre per year from water and 20 tons per acre per year from wind on these sensitive soils. Losses of vegetative production could be expected to affect livestock (cross-reference: Grazing Management, Part II).

The irretrievable loss of riparian areas can be expected along drainage channels where increased runoff incises the drainage channel below its present level.

MANAGEMENT OPPORTUNITIES

The major opportunities for improving watershed conditions in the resource area are: (1) administrative actions; (2) vegetation manipulation or treatment; and (3) development of watershed structures. The opportunity exists to incorporate watershed concerns with management of other resources.

Administrative actions could include restriction of grazing levels or seasons of use on lands considered sensitive, as well as restriction of mineral exploration and development or ORV use from these lands.

Vegetation manipulation and treatment could include conversion of pinyon-juniper vegetation types or sagebrush types to grasslands.

Development of instream structures could include construction of stock ponds, sediment control structures, gully plugs, or headcut structures.

Specific projects, such as fencing and planting in riparian areas, could be identified in activity plans, AMPs, or HMPs developed after completion of the RMP (cross-reference: Grazing Management and Wildlife Habitat Management, Part II). Land use restrictions, such as ORV designations, would be developed in the RMP (cross-reference: Recreation/Visual Resources Management, Part II).

Watershed management actions could be proposed to (1) attempt to reduce the amount of salt and sediment yield to the Colorado River system; (2) protect floodplains or wetlands from development; (3) protect watersheds of streams or ground water sources used for public drinking water; and (4) develop water supplies for livestock or wildlife.

The entire area is part of the Colorado River watershed. Downstream the Colorado River is used as a drinking water supply. This factor would have to be considered in analyzing the impacts of any major development in the SJRA on downstream users.

Certain sensitive areas, such as Montezuma Creek or Bucket Canyon Spring, as shown on the Hazardous and Sensitive Watershed Areas overlay, could benefit from development of special watershed management plans after completion of the RMP. These would be done at the activity plan level.

Management plans could also be developed to ensure that waters in the SJRA continue to meet the applicable state classifications shown in table 4340-3, and to protect the stream segments designated as antidegradation segments in Section 208 plans. Section 208 planning has not been completed for the SJRA; no segments have been so designated as of March 1985.

ACEC POTENTIAL

Three separate hazardous and sensitive watershed areas can be considered as having potential for ACEC designation. These are (1) the drainage basin for Recapture Dam, (2) drainage basins with significant downcutting or flooding hazards, and (3) sensitive areas that contribute significant amounts of salt or sediment to the Colorado River system (see figure 4340-1).

Recapture Dam Drainage Basin

The drainage basin for the Recapture Dam lake has potential for ACEC designation. This includes about 7,000 acres on public lands, including the lake. A portion of this (20 acres) is under R&PP lease by the San Juan Water Conservancy District for the dam and related facilities (cross-reference: Energy Realty/Nonenergy Realty/Withdrawal Processing and Review, Part II).

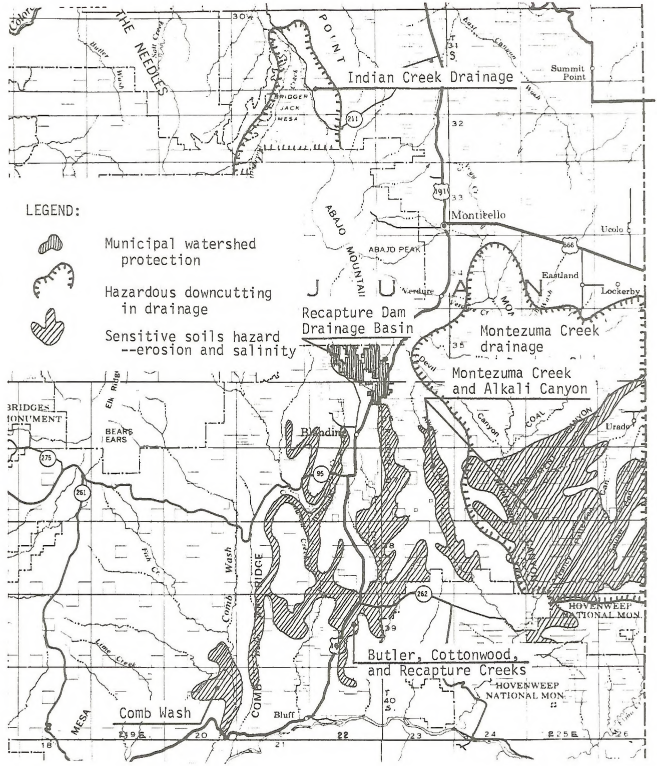

LEGEND:
Municipal watershed protection
Hazardous downcutting in drainage
Sensitive soils hazard --erosion and salinity
Indian Creek Drainage
Recapture Dam Drainage Basin
Montezuma Creek drainage
Montezuma Creek and Alkali Canyon
Butler, Cottonwood, and Recapture Creeks
Comb Wash
THE NEEDLES
BRIDGER JACK MESA
ABAJO MOUNTAI
ABAJO PEAK
Monticello
Summit Point
Ucolo
Eastland
Lockerby
Verdure
Blanding
Urado
BEARS EARS
Bluff
HOVENWEEP NATIONAL MON.
COMB RIDGE
MESA
211
191
666
95
275
261
262

FIGURE 4340-1

Potential ACECs, Watershed

Surface water for municipal culinary use is derived almost exclusively from the Abajo Mountains. One exception is runoff that will feed the Recapture Reservoir. Most of the water stored in this reservoir will be used for irrigation. The City of Blanding will have rights, however, to some of the water, and will utilize it as an emergency culinary supply. A small amount of the runoff that feeds this reservoir will drain from BLM administered public lands.

Special management of this watershed is necessary to protect water quality and ensure its suitability for culinary use.

Use of these public lands as a municipal watershed could be threatened by surface disturbing activities such as recreational use, mineral exploration, and livestock grazing. Surface contaminating activities related to wastewater disposal and the unsanitary activity that occurs with recreation use and the presence of livestock could also cause conflicts. Protection of this area would ensure its suitability as a municipal watershed. An alternative would be to manage for enhanced vegetation and restricted use, with runoff monitoring to detect any insufficiencies in the management prescription. Management must be flexible enough to readjust if water quality standard violations are detected.

The riparian area of Recapture Creek downstream from Recapture Dam has been identified as having potential for ACEC designation to protect wildlife habitat values (cross-reference: Wildlife Habitat Management, Part II). The two potential ACEC areas could be combined. It is also discussed below for its potential as an ACEC to recognize sensitive soils.

Designation as a municipal watershed would be sufficient in itself to require the necessary stipulations to protect its value as a source of municipal water. The same management prescriptions could be enforced.

There has been no documented expression of interest by the public or any other agency in protection of this area as a municipal watershed.

Significant Hazardous Drainage Basins

Several drainages have been identified as having significant downcutting or floodplains. These include Montezuma Creek, Butler Wash, Cottonwood Wash, Comb Wash, Indian Creek, and portions of the San Juan River. Downcutting is a source of sediment to the Colorado River system; it also lowers the ground water table in that part of the drainage, which reduces riparian vegetation and affects the aquatic habitat (cross-reference: Wildlife Habitat Management, Part II).

In particular, the Montezuma Creek drainage (about 165,000 acres of public lands) and the Indian Creek drainage (about 25,000 acres of public lands) present hazards to cultural sites, aquatic habitat, and present land uses. The following discussion is limited to these two drainages, which are believed to have the greatest significance for potential ACEC designation to identify natural hazard areas.

Montezuma Creek Drainage

Cultural sites in Montezuma Creek have reportedly been lost as a result of flooding and downcutting. Significant downcutting in a portion of Indian Creek has affected the riparian vegetation and the aquatic habitat for fish. Fisheries potential within the SJRA is limited. Further loss of aquatic habitat would be critical. Flooding and downcutting in the other drainages mentioned could affect similar values, but not significantly.

Cultural remains in Montezuma Creek are extensive. It appears to have been one of the most heavily populated canyons in the Monticello-Blanding area. Downcutting in Montezuma Creek appears to have occurred only recently. Further erosion within the canyon could affect more cultural sites. Periodic flooding in these drainages has threatened cultural sites adjacent to the stream channel (cross-reference: Natural History/Cultural Resources Management, Part II) and other man-made structures.

The land ownership in the Montezuma Creek Basin is mixed. The upper portion of the drainage basin on the mesas south and east of Monticello and Blanding is privately owned. This land is used primarily for dryland farming, with some irrigation. The canyon floor is intermixed private and federal land, with irrigated farming and ranching on the private land. The federal land is used for grazing, with some oil and gas development. The area is adjacent to the Navajo Indian reservation on the south, and to the Anasazi Culture Multiple Use Area ACEC of the San Juan Resource Area, Montrose District, Colorado to the east (BLM, 1984a).

The downcutting in the canyon is believed to result from increased runoff from agricultural lands. The SCS is presently involved in several demonstration projects on these lands with the objective of reducing runoff and erosion.

On the public lands, some chaining has been done to convert pinyon-juniper and sagebrush communities to grasslands. This conversion can at least initially increase runoff until a good vegetative cover is established. Runoff would need to be controlled on the conversion site, and slowed off the site, to reduce the impacts to Montezuma Creek. A successful conversion to grassland vegetation would reduce runoff and erosion.

Oil and gas development within the Montezuma Creek drainage basin has been active. Most activity has been within the lower portions of the canyon and tributary drainages. This development has included seismograph work, as well as drilling sites, and has led to an extensive network of roads, trails, and drill pads. Much of the terrain is rough, and some of the soils are clayey and slightly saline. Revegetation of disturbed areas is difficult. Any attempt to reduce runoff into the drainages of Montezuma Creek would need to emphasize control of runoff from drill pads, reclamation of all abandoned sites and access roads, and limitation of access to existing roads and trails. This is presently being done.

The Montezuma Creek drainage potential ACEC overlaps the Alkali Ridge potential ACEC to protect archaeological values (cross-reference: Natural History/Cultural Resources Management, Part II);

the Montezuma Canyon drainage riparian potential ACEC to protect wildlife habitat values; and the Montezuma-Alkali Point crucial deer winter range potential ACEC to protect wildlife habitat values (cross-reference: Wildlife Habitat Management, Part II). It also overlaps the Montezuma Creek sensitive soils area discussed below.

Indian Creek Drainage

The State of Utah considers Indian Creek, particularly upstream from Newspaper Rock State Park, to be important for its aquatic habitat and fishery potential (cross-reference: Wildlife Habitat Management, Part II). Increased downcutting would further threaten the riparian vegetation and the aquatic habitat. Most of this portion of Indian Creek is public land and is used for grazing, with scattered state sections and blocks of private lands interspersed. It is adjacent to Manti-LaSal NF to the south, and adjoins the area covered by Newspaper Rock State Park.

To protect this stream, the area immediately adjacent to it would have to be closed to both livestock and vehicular travel.

The Indian Creek drainage potential ACEC overlaps the Bridger Jack Mesa and Lavender Mesa potential ACECs to protect rangeland and recreational values (cross-reference: Grazing Management and Recreation Management, Part II); the North Abajo potential ACEC to protect archaeological values (cross-reference: Natural History/Cultural Resources Management, Part II); the Indian Creek drainage potential ACEC to protect wildlife habitat values; and the Salt Creek Mesa crucial deer winter range potential ACEC to protect wildlife habitat values (cross-reference: Wildlife Habitat Management, Part II). The potential ACEC is adjacent to the Hart Point-Hart Draw crucial deer winter range potential ACEC to protect wildlife values.

The Bridger Jack Mesa and Lavender Mesa potential ACECs have been identified as also having potential for RNA designation (cross-reference: Grazing Management, Part II). The intent of an RNA is to set aside an area for scientific research. RNA designation would be compatible with a watershed related ACEC designation.

Effective ACEC boundaries would be the drainage limits as shown in figure 4340-1; however, these could be difficult to mark or recognize in the field. Alternative boundaries for either area could be developed by eliminating or including more of the drainage area (refer to the Watershed Areas overlay, Water, Part I). The areas are independent of each other, and an ACEC designation could be placed on one or both areas.

The other areas mentioned above (Butler Wash, Cottonwood Wash, and portions of the San Juan River) should be monitored and assessed during periodic review of the RMP to determine whether the natural hazard presents a significant concern with potential for ACEC designation.

Sensitive Soil Areas

Sensitive soil areas and areas of badland and gypsumland are sources of sediment and salt to the Colorado River system (cross-reference: Water, Part I). Salt and sediment loads of the Colorado River are of national concern. Badland and gypsumland are natural sources of relatively high levels of sediment and salt. Surface disturbance in these areas would marginally increase erosion rates for a short time. Disturbance of sensitive soils can substantially increase erosion rates and threby contribute sediment and salt to the Colorado River system. The rates of erosion can remain high for several years, until vegetation is re-established or until the surface has been stabilized with rock fragments or other debris.

The main areas of concern are along the lower portion of Comb Wash on its west flank (about 5,000 acres); portions of Butler, Cottonwood, and Recapture Creeks and their tributaries (about 42,000 acres); and Montezuma Creek and Alkali Canyon and their tributaries (about 70,000 acres). Sensitive soils occur with more stable and nonsaline soils in all these drainages. These areas are shown on the Hazardous and Sensitive Watershed Areas overlay, as well as in figure 4340-1. The ACEC potential would be to identify natural hazards.

Most of the affected area is public land, with tracts of state and private land scattered throughout. It is used primarily for grazing and oil and gas exploration and development. Special management attention is not needed. Proper grazing management and surface reclamation requirements and stipulations adequately protect the special values.

The Comb Wash area overlaps the Comb Wash drainage potential ACEC to protect riparian and aquatic wildlife habitat (cross-reference: Wildlife Habitat Management, Part II) and is adjacent to the Recapture Dam drainage basin potential ACEC discussed above. The Butler, Cottonwood, and Recapture Creeks area overlaps the Alkali Ridge potential ACEC to protect archaeological values (cross-reference: Natural History/Cultural Resources Management, Part II); the Butler Wash and Recapture Creek drainages potential ACECs to protect riparian and aquatic wildlife habitat; the Black Mesa Butte crucial deer winter range potential ACEC to protect wildlife habitat; and the Montezuma-Alkali Point potential crucial deer winter range ACEC to protect wildlife habitat (cross-reference: Wildlife Habitat Management, Part II). The Montezuma Creek area overlaps the Alkali Ridge potential ACEC to protect archaeological values; the Montezuma Creek drainage potential ACEC to protect riparian and aquatic wildlife habitat; the Montezuma-Alkali Point potential crucial deer winter range ACEC to protect wildlife habitat; and the Montezuma Creek potential ACEC, described above, to protect hazardous drainages.

The Comb Wash area is adjacent to or slightly overlaps the Road Canyon and Lime Creek potential ONAs (cross-reference: Recreation/Visual Resources Management, Part II). An ONA is suitable for intensive recreation management and would not necessarily be incompatible with an ACEC designation to recognize soils hazards.

The Butler, Cottonwood, and Recapture Creeks area and the Montezuma Creek area are adjacent to the Navajo Indian reservation; some of the related sensitive soils areas fall within reservation boundaries.

Boundaries of the sensitive soils areas would be difficult to determine in the field for those inexperienced in soils sciences. The irregular areas are somewhat subjective in delineation. They would be difficult to mark in the field, whether by signs or other means. Alternative boundaries to those shown in figure 4340-1 could be developed to exclude some drainages, but this would result in loss of value of recognizing the entire potential hazard area through ACEC designation.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Optimum management of watershed resources is constrained by the requirement to manage public lands for multiple uses. Activities that contribute to soil erosion and deterioration of water quality must nevertheless be allowed.

DOCUMENTED PUBLIC CONTROVERSY

None identified.

4340 AIR QUALITY MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

None.

RESOURCE OVERVIEW

The air resource is generally described in terms of air quality or air pollution. The higher the quality of air, the greater the visual range within an area.

The visual range for the continental U.S. is shown in figure 4340-2. The SJRA lies within the area shown as having the greatest visual range. This range was measured from CNP to be 121 miles, which is fairly consistent with other measurements made throughout the state (Aerocomp, Inc., 1984).

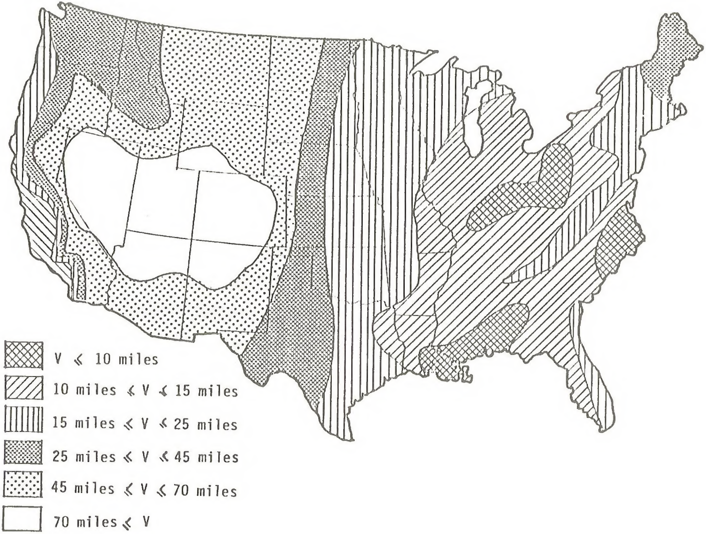
BLM evaluates potential impacts to air quality from proposed activities by considering topographic or airshed features, atmospheric stability, mixing height, average wind speed through the mixed layer, and the interaction of these variables.

Airshed

Airsheds are regions within which air movement tends to be confined by topographical barriers, meteorology, and local circulations. Particularly under weak synoptic weather conditions, flow in the boundary layer is determined by circulations driven by the local terrain. Principal airshed boundaries are shown in figure 4340-3. Landform features are shown in figure PP-8 in Topography, Part I.

The Upper Colorado River airshed is bounded on the west by the Wasatch Plateau and Range, on the north and east by the Roan Plateau and Rocky Mountains. These topographic features severely limit air flow out of the basin. The southern boundary is less defined, however, and flow exchanges are more common. The mountain-valley flow associated with the Little Colorado (in northern Arizona) and San Juan Rivers allows for the exchange of outside air. Also, flow out of the basin through the lower elevations between the Kaibab and Wasatch Plateaus results from strong northeasterly winds. Given the terrain between the Wasatch Plateau and west central Colorado, flow tends to be uniform in the region.

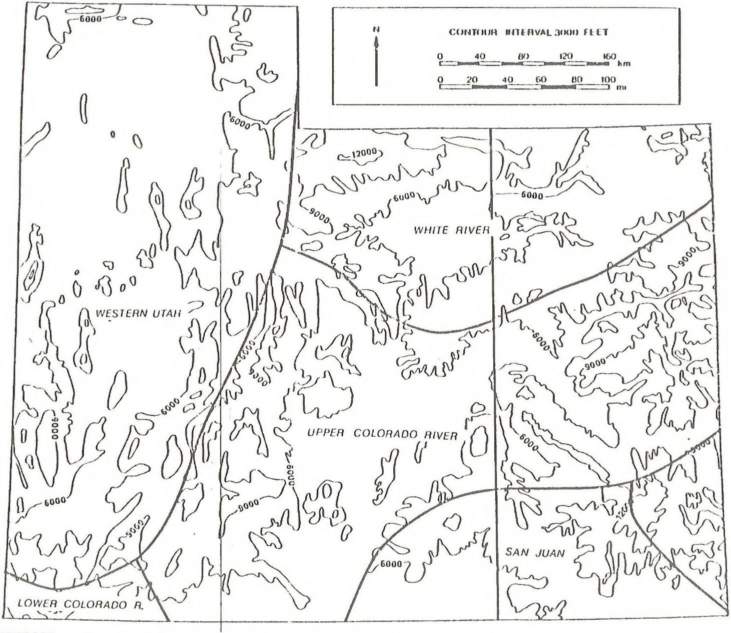
Most of the SJRA is included in the Upper Colorado River airshed; a small amount is included in the San Juan airshed, which is bounded on the north by the San Juan River drainage.


V ≤ 10 miles
10 miles ≤ V ≤ 15 miles
15 miles ≤ V ≤ 25 miles
25 miles ≤ V ≤ 45 miles
45 miles ≤ V ≤ 70 miles
70 miles ≤ V

Source: NPS and BLM, 1984.

FIGURE 4340-2

Visual Ranges for the Continental United States (yearly average visibilities, March 1980)


N
CONTOUR INTERVAL 3000 FEET
0 40 80 120 160 km
0 20 40 60 80 100 mi
WESTERN UTAH
WHITE RIVER
UPPER COLORADO RIVER
SAN JUAN
LOWER COLORADO R.
6000
9000
12000

Source: Aerocomp, Inc., 1984.

FIGURE 4340-3

Topographic Features and Principal Airshed Boundaries

The closest wind distribution data are available from the Salt Wash Ambient Air Quality Monitoring Station. The wind rose from this station is shown in figure 4340-4.

Existing state meteorological stations and ambient air quality monitoring stations are listed and shown in the Final Air Quality Analysis for the Combined Hydrocarbon EIS, Eastern and South-Central Utah Parts I and II (Aerocomp, Inc., 1984).

To characterize low level flow in southeastern Utah, the IPP meteorological site at Salt Wash was used. Southeasterly to northeasterly winds predominate, thus reflecting the prevailing flow at these latitudes.

The 700 mb wind roses (approximately 10,000 ft) for Grand Junction and Salt Lake City are given in figures 4340-5 and 4340-6 respectively. The regional westerlies are quite evident at both sites.

Atmospheric Stability Distribution

Stability distributions for three sites in and near the resource area are given in figure 4340-7. Bald Knoll and Salt Wash are located in the Upper Colorado River airshed. All three sites show that stable conditions prevail throughout the region, with unstable conditions occurring less than 15 percent of the time. Neutral stability is expected approximately 30 percent of the time. Figure 4340-8 shows ideal dispersion patterns for various stability conditions.

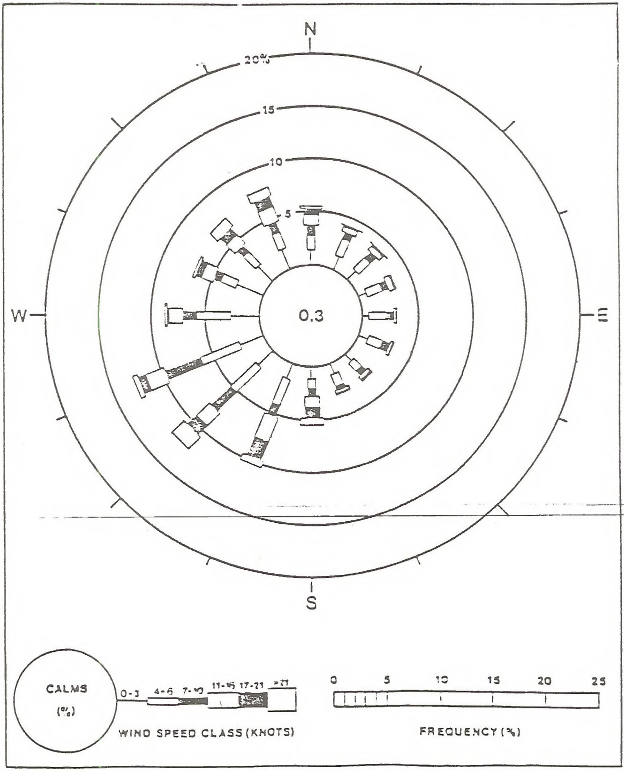
Seasonal and Annual Average Mixing Heights

Mixing height and wind speed through the mixing layer for SJRA are given in table 4340-11. These figures were calculated for the Tar Sand Triangle STSA, located adjacent to the SJRA (west of the Colorado River) and should characterize the situation in SJRA.

As noted from the table, the depth of the mixing layer varies diurnally; mixing heights are higher in the afternoon as a result of daytime heating and lower in the morning following nocturnal cooling. Mixing heights may be higher in rugged terrain and lower in sheltered valley locations.

The mixing depth is shallowest during the winter season when afternoon mixing heights may reach only to 1,000 to 1,200 meters. Convection (i.e., vertical mixing) is at a minimum, due to reduced incoming solar radiation and increased cloud cover. Often, in conjunction with high pressure aloft, a subsidence inversion occurs, which effectively suppresses vertical mixing.

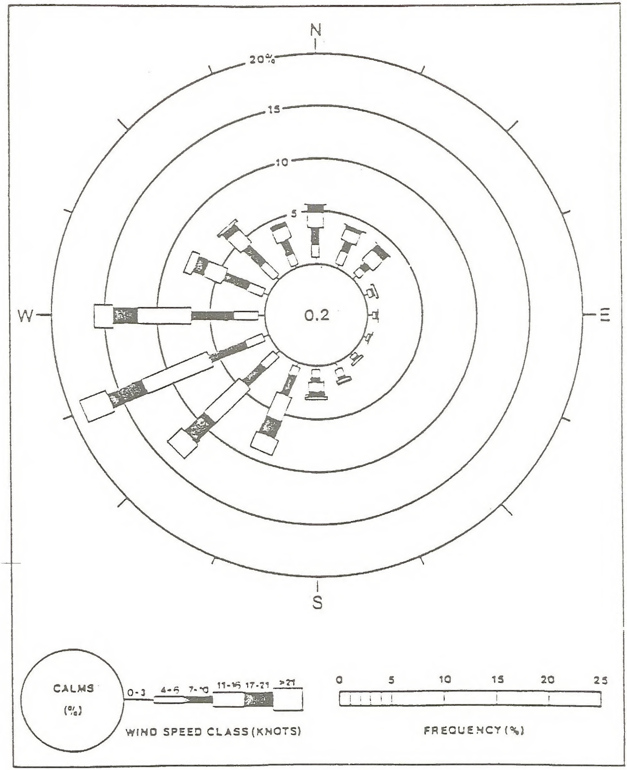
The afternoon mixing heights are greatest during the summer season, attaining heights of 3,800 to 4,000 meters. This results from the intense daytime heating that occurs in the region during summer.



Source: Aerocomp, Inc. 1984.

FIGURE 4340-4

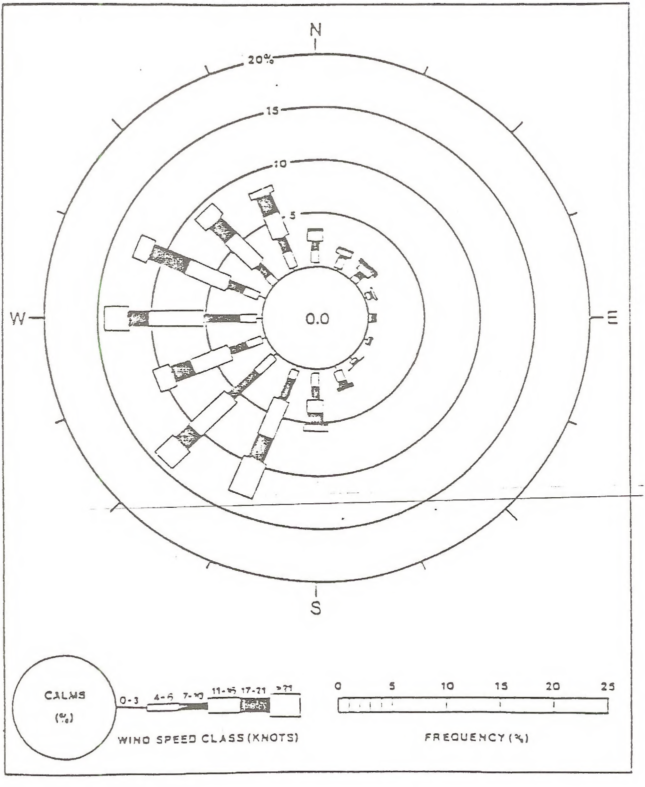
Annual Wind Rose for Salt Wash (3/75 to 2/76)



Source: Aerocomp, Inc., 1984.

FIGURE 4340-5

Annual 700 mb Wind Rose for Grand Junction, Colorado (1/79 to 12/80)

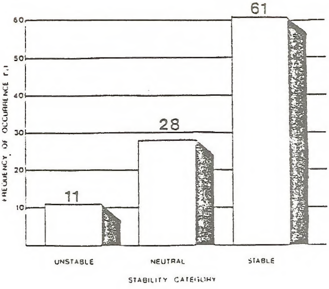


Source: Aerocomp, Inc., 1984.

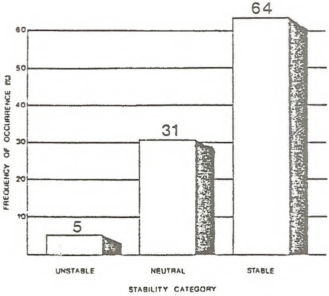
FIGURE 4340-6

Annual 700 mb Wind Rose for Salt Lake City (1/78 to 12/79)

BALD KNOLL 3/78-11/79



SALT WASH 3/75-2/76



U-a/U-b 6/75-12/79

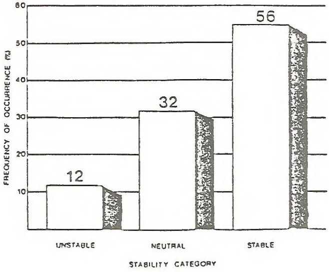
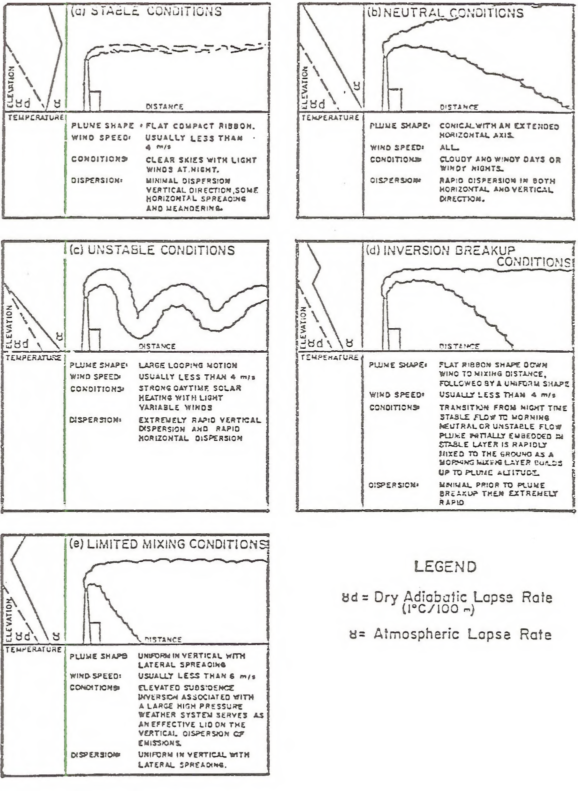


FIGURE 4340-7

Annual Stability Distribution

Source: Aerocomp, Inc., 1984.


ELEVATION
TEMPERATURE
DISTANCE
γd
γ
LEGEND
γd = Dry Adiabatic Lapse Rate (1°C/100 m)
γ = Atmospheric Lapse Rate

(a) STABLE CONDITIONS

PLUME SHAPE:	FLAT COMPACT RIBBON.
WIND SPEED:	USUALLY LESS THAN 4 m/s
CONDITIONS:	CLEAR SKIES WITH LIGHT WINDS AT NIGHT.
DISPERSION:	MINIMAL DISPERSION VERTICAL DIRECTION, SOME HORIZONTAL SPREADING AND MEANDERING.

(b) NEUTRAL CONDITIONS

PLUME SHAPE:	CONICAL WITH AN EXTENDED HORIZONTAL AXIS.
WIND SPEED:	ALL.
CONDITIONS:	CLOUDY AND WINDY DAYS OR WINDY NIGHTS.
DISPERSION:	RAPID DISPERSION IN BOTH HORIZONTAL AND VERTICAL DIRECTION.

(c) UNSTABLE CONDITIONS

PLUME SHAPE:	LARGE LOOPING MOTION
WIND SPEED:	USUALLY LESS THAN 4 m/s
CONDITIONS:	STRONG DAYTIME SOLAR HEATING WITH LIGHT VARIABLE WINDS
DISPERSION:	EXTREMELY RAPID VERTICAL DISPERSION AND RAPID HORIZONTAL DISPERSION

(d) INVERSION BREAKUP CONDITIONS

PLUME SHAPE:	FLAT RIBBON SHAPE DOWN WIND TO MIXING DISTANCE, FOLLOWED BY A UNIFORM SHAPE
WIND SPEED:	USUALLY LESS THAN 4 m/s
CONDITIONS:	TRANSITION FROM NIGHT TIME STABLE FLOW TO MORNING NEUTRAL OR UNSTABLE FLOW PLUME INITIALLY EMBEDDED IN STABLE LAYER IS RAPIDLY MIXED TO THE GROUND AS A MORNING MIXING LAYER BUILDS UP TO PLUME ALTITUDE.
DISPERSION:	MINIMAL PRIOR TO PLUME BREAKUP THEN EXTREMELY RAPID

(e) LIMITED MIXING CONDITIONS

PLUME SHAPE	UNIFORM IN VERTICAL WITH LATERAL SPREADING
WIND SPEED:	USUALLY LESS THAN 6 m/s
CONDITIONS:	ELEVATED SUBSIDENCE INVERSION ASSOCIATED WITH A LARGE HIGH PRESSURE WEATHER SYSTEM SERVES AS AN EFFECTIVE LID ON THE VERTICAL DISPERSION OF EMISSIONS.
DISPERSION:	UNIFORM IN VERTICAL WITH LATERAL SPREADING.

FIGURE 4340-8

Idealized Dispersion Patterns from a Tall Stack under Varying Atmospheric Conditions

TABLE 4340-11

Mean Seasonal and annual Morning and Afternoon Mixing Heights and Wind Speeds through the Mixed Layer

	Winter		Spring		Summer		Fall		Annual	
Time	H (m)	U (m/sec)	H (m)	U (m/sec)	H (m)	U m/sec)	H (m)	U m/sec)	H (m)	U (m/sec)
M	250	3.0	450	5.0	250	4.0	250	3.5	325	4.0
A	1150	4.0	3100	7.0	4000	6.5	2200	5.0	2600	6.0

NOTE: H = mixing height, in meters; U = wind speeds in meters per second; M = morning; A = afternoon.

Source: Aerocomp, Inc., 1984.

Spring and fall are transition periods. During fall, the area is often under the influence of high pressure and therefore reduced vertical mixing. Spring afternoon mixing heights are about 700 to 900 meters higher than those observed in the fall due to greater solar insolation (Aerocomp, Inc., 1984).

Wind speeds through the mixed layer also vary diurnally. Morning wind speeds average approximately 4 m/sec; in the afternoon they are about 2 m/sec faster. The seasonal trend in average wind speed through the mixed layer is not nearly as dramatic as that for mixing height. Wind speeds in the boundary layer are generally greater in the spring and summer.

In summary, poor dispersion conditions occur most frequently in the winter when mixing heights are low and winds are light.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

National Laws

FLPMA specfies the protection of air and atmospheric quality on BLM lands in Section 102(a)(8) and compliance with state and federal laws in Section 202(c)(8). FLPMA also requires an active role in preventing air quality violations on BLM lands in Section 302(c).

The Clean Air Act of 1963 directs that any BLM activity resulting, or which may result, in discharge of air pollutants shall be subject to, and comply with, all federal, state, interstate, and local requirements, administrative authority, and process and sanctions to the same extent as any non-governmental entity.

The Clean Air Act Amendments of 1977 generally relax the rigorous deadlines imposed by the Clean Air Act Amendments of 1970 without sacrificing the Act's ultimate goals. These amendments allow incremental increases in air pollutants by class. A detailed explanation of the requirements of the Clean Air Act as amended is given in appendix 4340-C at the end of this chapter.

The Economy Act of 1932, as amended, forms the basis for agreements among the BLM and USGS, USFS, NPS, and EPA for air resource monitoring and impact modeling activities.

Regulations

Regulations at 40 CFR 50 and 51 establish EPA's NAAQS and PSD provisions. The NAAQS are uniform minimum national standards for air quality.

The EPA regulations also establish three air quality classifications (see appendix 4340-C).

RESOURCE ALLOCATIONS

As discussed in Appendix 4340-C, the air resource is allocated by PSD classifications (see table 4340-12) and integral vista designations.

TABLE 4340-12

Prevention of Significant Deterioration Increments (Micrograms per cubic meter)

Pollutant	Averaging Time	Maximum Allowable Concentrations Class I	Maximum Allowable Concentrations Class II
SO_2	Annual	2	20
	24-hour	5	91
	3-hour	25	512
TSP	Annual	5	19
	24-hour	10	37

Changes in PSD classifications, generally from Class II to Class I, would result from a state or congressional decision, no doubt with input from the land manager through the Secretary.

Integral vista designations would be proposed to the state by the Secretary of the Department having a vista that needed special protection. The proposal would then be considered in the visibility SIP.

The RMP does not play a part in PSD classifications or integral vista designations.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

Management of the BLM air resource is based on the premise that human activities in the natural environment can affect air quality. The air resource is dynamic in nature and not necessarily constrained by topographic or administrative boundaries. Air quality above the public lands has an influence on and is influenced by activities on public lands, and on other adjoining federal, state and private lands. It is the policy of BLM to manage the air resource within acceptable air quality standards prescribed by federal, state, and local laws and regulations and to improve existing air quality whenever possible.

SJRA air is currently clean because population sizes are small and spread out and because industrial activity is extremely limited.

Assessing existing air quality and comparing it to applicable state and federal ambient air quality standards is very difficult for the SJRA. No air quality monitoring has occurred within the resource area. There has been monitoring for particulate matter and visibility in CNP. Monitoring data also exist from several other sites throughout the state. The Salt Wash station, near the proposed IPP close to Hanksville, is the site most representative of the SJRA, except for what is available from CNP.

Limited sampling from the Salt Wash station found ambient SO_2 concentrations below what can be detected by the monitoring equipment. SO_2 concentrations are assumed to be equal to or less than half the monitor threshold of 26 ug/m^3. A summary of all measurements made from this site, given in table 4340-13, shows pollutant levels to be well below the NAAQS (see appendix 4340-C). NAAQS are listed in table 4340-14. Only ozone concentrations were elevated above what one would expect for background concentrations in a pristine area. High ozone concentrations have been observed in many remote areas, possibly because of injection from the stratosphere or because of long-range transport from urban areas (NPS and BLM, 1984).

A major polluting source, according to State of Utah definitions, is one that emits more than 100 tons of a pollutant in a year. Existing major polluting sources include the Energy Fuels uranium mill near Blanding and compressor engines for oil well reinjection systems and natural gas pipelines.

TABLE 4340-13

Summary of Air Quality Measurements at Salt Wash

Pollutant	Maximum Concentration (ug/m^3) 1-Hour	3-Hour	24-Hour	Average of all Samples[b]
Sulfur dioxide	[a]3	[a]3	[a]13	[a]13
Nitrogen dioxide	40	--	--	13
Ozone	132	--	--	59
Particulate matter	--	--	90	[c]19

[a] Assumed to be one-half the detectable limit of the monitor.

[b] Assumed to represent annual geometric mean.

[c] Geometric mean.

Source: NPS and BLM, 1984.

TABLE 4340- 14

Applicable State and Federal Ambient Air Quality Standards

Pollutant			Utah ($\mu g/m^3$)	Federal ($\mu g/m^3$)
SO_2				
	Primary	annual	80	80
		24-hour[a]	365	365
	Secondary	3-hour	1,300	1,300
Particulate matter				
	Primary	annual	75	75
		24-hour[a]	260	260
	Secondary	annual	60	60
		24-hour[a]	150	150
CO				
		8-hour	[b]10,000 mg/m^3	[b]10,000 mg/m^3
		1-hour	[b]40,000 mg/m^3	[b]40,000 mg/m^3
O_3				
		1-hour[c]	235	235
NO_2				
		annual	100	100
Lead		1/4 year	1.5	1.5

---

[a] Not to be exceeded more than once per year.

[b] Milligrams per cubic meter.

[c] Expected number of days in a calendar year with maximum hourly values above 235 ug/m^3 cannot exceed one.

Source: NPS and BLM, 1984.

Gas flares are also emitters of NOx, CO, particulate matter, and possibly SO_2, if the gas is not cleaned before it is flared. They are not generally considered a major source. In addition, any construction, road development activity, or sand and gravel operations are potential sources of particulate matter. Resulting particulate concentrations can be a local problem, particularly in calm wind conditions, but are not considered major pollution sources.

The entire SJRA is a Class II air quality area. However, CNP, located immediately adjacent to the SJRA, is a Class I area, giving it special protection against air quality degradation. Arches National Park and Capitol Reef National Park are two other Class I areas that are located within 10 and 20 miles, respectively, of the SJRA boundary.

To comply with the Clean Air Act Amendments, BLM listed both of the PAs in the SJRA, Grand Gulch and Dark Canyon, as having AQRVs that are important attributes of the area. It was not the intent of BLM to recommend these areas for Class I redesignation.

The four MFPs are silent on air quality management and related concerns.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County. For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

For the most part, air quality management is governed by state and federal regulations. BLM, in cooperation with the State of Utah, manages activities to maintain the air resource within the air quality standards prescribed by federal, state and local laws.

Tourism is the industry most dependent on the SJRA's air quality. The local importance of tourism is discussed in the Recreation chapter. Although tourism accounts for a sitnificant portion of the county's economic actibity, the proportion of this local economic activity that is due to the area's air quality cannot be quantified.

Several other economic activities rely on the SJRA's air resource, not for aesthetics, but as a medium for emitting pollutants. To this date (mid-1985) air quality management has neither prevented nor altered any economic activity in the SJRA. Most major polluting sources in the SJRA are from the mining sector, the local importance of which is discussed under the various mining programs. Although no economic activity has thus far been restricted by air quality management, major mining construction, manufacturing and utility development could potentially be affected in the future. The Area Manager could also prevent prescribed fires to protect air quality values and recommend areas to the state for integral vista designations. Preventing prescribed fires could affect the livestock industry; an integral vista designation could constrain major mining construction, manufacturing, and utility developments.

If the area manager recommended that an area be redesignated to Class I status and the Secretary of Interior and either Congress or the state accepted that recommendation, all the restrictions discussed previously for Class I areas would be imposed on that portion of the SJRA.

Little or none of the governmental cost related to managing air quality in the SJRA contribute to local sales, income, or employment.

The air resource affects the revenues and costs of local taxing jurisdictions only insofar as the air resource affects other economic activities. Because the relationship between the air resource and economic activities cannot be quantified, the local fiscal effects of the resource cannot be quantified.

CONSISTENCY WITH NON-BUREAU PLANS

Management of the air resource must remain consistent with the SIP and the visibility portion of the SIP, which is currently being developed. The NPS is preparing a fire management plan that should be finalized in 1985. Consistent policy between the NPS and the BLM is not guaranteed. The NPS manages for preservation and recreation and is much more concerned about AQRVs on their Class I lands than BLM is on its Class II lands.

DATA GAPS

No air quality monitoring has occured within the SJRA.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

As has been discussed, air quality is quite good within the resource area. There is very little, if any, local demand to improve it. There are those, particularly the tourist industry and recreationists, who want more stringent controls in the way of integral vista designations, to protect existing air quality.

Extensive vista designations, if accompanied by stringent state regulations, could severely limit resource area management options involving major development of natural resources. Such regulations have not yet been generated, and the state is only now considering the right balance between protection and development.

The San Juan County Commission and most local residents are opposed to stricter controls such as vista designations, as was revealed in the November 14, 1984 scoping meetings. Stricter controls would also concern the few industrial interests in SJRA, because such restrictions would further constrain new development or expansion.

An accurate BLM work month assessment for air quality management is very difficult, if not impossible. Air quality concerns become apparent with almost any planning exercise. Time spent for such work is not recorded for air quality, but rather is charged to the benefitting activity, such as oil and gas or mining. When modeling is required, 0.25 to 0.5 work month could easily be spent for each modeling exercise. The resource area does not have the expertise required; this must be obtained from the Moab District or USO staff.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

The depressed local economy has created much concern about suggestions to regulate air quality more closely than it is now regulated. Development of resources and accompanying industry could not only produce jobs, but could also degrade air quality.

Essentially, future demands on this resource will be an extension of the current situation. No major new development of resources is anticipated. Ability to meet unexpected future demands will have to be considered on a case-by-case basis as potential air quality impacts are tested against the threshold criteria.

Future demands on air quality appear to be greater from outside sources than from those within the SJRA. Regional haze is developing from up-wind, western sources of pollutants that are growing rapidly, in some cases, while local economics remain sluggish. As air deteriorates in more populated areas, the concern and desire for pristine conditions in areas such as SJRA may increase. If, in the future, the state does embrace stricter local air quality controls, the question of resource capability may be overshadowed by the question of local economic capability to survive.

Resource area ability to meet such demands will, of course, depend on the degree of air quality control. All-inclusive vistas with strict regulations governing plume blight and regional haze could remove any management option that might entail the generation of dust or other pollutants that affect visibility.

CRITICAL THRESHOLDS

The critical thresholds that need to be considered in analyzing impacts to air quality are the regulations themselves. Modeling on an individual basis is, by necessity, the means to predict whether any action will cross the threshold posed by a limitation or standard.

A critical threshold for air quality resources would be reached if management actions exceeded the secondary NAAQS (see table 4340-14). De minimis emission rates, or the corresponding monitoring exemptions, can also be used as a critical threshold (see table 4340-15). If modeling shows that concentrations will exceed the level given as the monitoring exemption level, than at least a year of baseline monitoring would be required to determine the total concentration of the pollutant.

TABLE 4340-15

De Minimis Levels

Pollutant	Emission rate	Monitoring Exemptions	
	(tons/year)	(ug/m3)	Averaging Period
Carbon monoxide	100	575	8-hour
Nitrogen oxides	40	14	Annual
Sulfur dioxide	40	13	24-hour
Particulate matter	25	10	24-hour
Ozone	40	N/A	
Lead	0.6	0.1	24-hour
Asbestos	0.007	N/A	
Beryllium	0.0004	0.0005	24-hour
Mercury	0.0004	0.0005	24-hour
Vinyl chloride	1.0	15	24-hour
Fluorides	3	0.25	24-hour
Sulfuric acid mist	7	N/A	
Hydrogen sulfide (H_2)	10	0.04	1-hour
Total reduced sulfur (including H_2S)	10	10	1-hour
Reduced sulfur compounds (including H_2S)	10	10	1-hour

EPA has established emission standards for asbestos, beryllium, mercury, and vinyl chloride (40 CFR 61). These standards can be viewed as critical threshold criteria.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Management of air quality within SJRA appears to be adequate, and the air quality is considered to be good.

The entire SJRA is considered an attainment area; that is, there are no current violations of NAAQS. Although polluting activities will continue and possibly expand, no large industrial or mineral extraction activities are expected throughout the life of the RMP. Therefore, good quality air is expected to persist throughout the area. The only serious air quality problems that might be encountered would probably be in relation to the CNP Class I area.

The CNP Class I area in particular imposes certain implications to activities that are proposed close to park boundaries. The Class I designation prevents any activity that would allow SO_2 or particulate matter concentrations to exceed allowable limits in the park. It also requires a lengthy review process for any activity that would propose to emit more than 250 tons of any pollutant or is on a list of major sources in the Utah Air Conservation Regulations. Once a review of this type, called a PSD new source review, is initiated, AQRVs must also be considered. Visibility is such an AQRV, and visibility can be degraded from particulate concentrations that might not otherwise exceed a standard. Visibility considerations, then, can impose greater restrictions on activities affecting CNP than would just NAAQS or PSD limitations.

MANAGEMENT OPPORTUNITIES

Management can strive to protect air quality without requesting redesignation of areas to Class I status.

Current laws and regulations do limit management opportunities when proposed activities threaten to violate standards established by the regulations.

Management must ensure the capability to complete the required modeling and assessments to sustain favorable air quality. An opportunity exists to monitor air quality within the SJRA to provide baseline data.

These opportunities could be realized on a case-by-case basis and do not require resolution through the RMP.

ACEC POTENTIAL

Dark Canyon and Grand Gulch PAs have been identified as having AQRVs that are important attributes of the areas and are thus potential ACECs (cross-reference: Recreation/Visual Resources Management, Part II). The Dark Canyon

PA contains 62,040 acres, and the Grand Gulch PA 37,807 acres (see figure 4340-9). AQRVs important to maintaining these PAs include visibility, odor, flora, fauna, and air quality itself.

The protection of these values will require special management attention if and when these areas are developed. These areas are regionally and nationally significant because of their scenic and pristine qualities.

No present land uses threaten these special values. Future industrial developments that pollute air quality, reduce visibility, emit obnoxious fumes, and generally affect sensitive flora and fauna that are now present could threaten the special values.

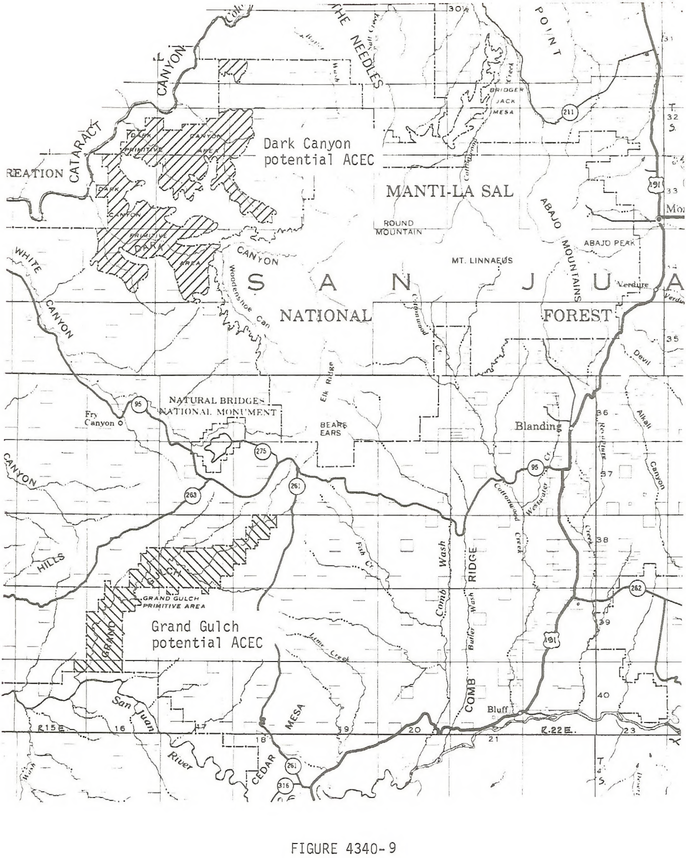
These lands are administered by BLM, and no land use claims or leases appear. The Dark Canyon PA is adjacent to the Dark Canyon Wilderness, Manti-LaSal NF; the Needles proposed wilderness, CNP; and the Dark Canyon proposed wilderness, GCNRA (cross-reference: Wilderness Management, Part II). The Grand Gulch PA is adjacent to the San Juan proposed wilderness, GCNRA. Management of these areas to maintain pristine air quality can be expected.

Adjacent lands are used for livestock grazing and recreation; these uses do not threaten the special values.

Protection can be afforded to these areas by routine analysis of any proposed development in light of the special values and by limiting vehicular traffic in the area. These values could also be protected with redesignation to class I status under PSD regulations. This consideration has been raised in the past and rejected by BLM as too restrictive to meet the level of protection necessary.

The Clean Air Act directes the federal land manager to review PAs and make recommendations for class I redesignation where AQRVs are important attributes of the area. To comply with this mandate, BLM identified Grand Gulch and Dark Canyon as having AQRVs, but did not recommend class I redesignation. The Utah Chapter of the Sierra Club, as well as some Salt Lake City residents, expressed their concern for stringent protection of the air quality in these two PAs (see letters on file, SJRA correspondence files).

The Dark Canyon and Grand Gulch PAs have been recognized as having ACEC potential to protect primitive recreation values (cross-reference: Recreation/Visual Resources Management, Part II). The Dark Canyon PA overlaps the Gypsum Canyon and Dark Canyon Drainages potential ACEC to protect riparian/aquatic habitat; the crucial bighorn habitat potential ACEC to protect wildlife values; and the Dark Canyon Plateau crucial deer winter range potential ACEC to protect wildlife values (cross-reference: Wildlife Habitat Management, Part II). The Grand Gulch PA overlaps Grand Gulch potential ACEC to protect archaeological values (cross-reference: Natural History/Cultural Resources Management, Part II); and the Grand Gulch Drainage potential ACEC to protect riparian/aquatic habitat (cross-reference: Wildlife Habitat Management, Part II). The AQRVs discussed here would be compatible with any of these potential ACEC designations.



Dark Canyon potential ACEC
Grand Gulch potential ACEC
DARK CANYON PRIMITIVE AREA
GRAND GULCH PRIMITIVE AREA
MANTI-LA SAL
SAN JUAN
NATIONAL FOREST
THE NEEDLES
CATARACT CANYON
WHITE CANYON
BRIDGER JACK MESA
ROUND MOUNTAIN
MT. LINNAEUS
ABAJO MOUNTAINS
ABAJO PEAK
Verdure
NATURAL BRIDGES NATIONAL MONUMENT
BEARS EARS
Fry Canyon
Blanding
Elk Ridge
Woodenshoe Can
COMB RIDGE
Comb Wash
Butler Wash
Cottonwood Creek
Westwater Cr.
CEDAR MESA
San Juan River
Lime Creek
Fish Cr.
Bluff
Devil Canyon
Alkali Canyon
GRAND GULCH
HILLS
POINT
95
211
191
275
261
263
262
316
R.15E.
16
17
18
19
20
21
R.22E.
23
T.32S.
33
35
36
37
38
39
40
T.4S.

FIGURE 4340-9

Potential ACECs, Air Quality

The Dark Canyon PA and some adjacent area, and the Grand Gulch PA and some adjacent area have been found to have potential as ONAs (cross-reference: Recreation/Visual Resources Management, Part II). These designations could also serve to protect AQRVs to some extent.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Human activities will always contribute, to some degree, to the degredation of air we breathe. EPA has developed regulations with standards to assess when air quality degradation threatens health and well-being. When one of these regulations is violated, the air resource could be said to be constrained. Based on the level of activity expected, management of other resource programs within the SJRA should not constrain air quality. Surface disturbing activities and machinery emit pollutants that could constrain Class I air in CNP if they occurred close enough to the park to violate a standard. The same things, including plumes emitting from any stacks, could constrain air in an integral vista (should any be designated) depending on what regulations govern the vistas.

Documented Public Controversy

A raging public controversy, as expressed in the scoping meetings which ended November 14, 1984, concerns the designation of integral vistas and regulations that would govern such vistas. In the Moab scoping meeting, the consensus was heavily weighted against any such designations; however, the Utah Air Conservation Committee acknowledged that this was not the case in scoping meetings in other parts of the state.

In 1978, controversy existed over the possible class I redesignation of Dark Canyon and Grand Gulch PAs. BLM had identified these areas in compliance with the Clean Air Act as having AQRVs that were important attributes of the areas. Although it was not BLM's intent to reclassify them to class I, the Sierra Club and private citizens from Salt Lake City expressed their support of such a redesignation.

Potential wilderness designations have also resulted in public comments addressing air quality. San Juan County felt that any wilderness area could, and very well might, become a Class I area; therefore, the county would resist any new wilderness areas which could limit new industrial development.

These comments are on file in the SJRA and Moab District offices.

Construction of DOE's proposed nuclear waste repository, as described in their EA, has also raised concern, particularly by CNP, on adverse impacts to air quality in the NPS Class I area.

APPENDIX 4340-A

Estimations of Soil Loss

The USLE has been used to estimate the volumes of sediment lost from a site. This equation is based on climate, cover, soil factors, and slope characteristics. It was originally developed in the Midwest using field trials on cropland. It has only recently been applied to rangelands or other wildlands. Studies using this equation and actual field trials indicate that the USLE provides good estimates for soil loss from erosion on rangeland for disturbed sites. Generally, for vegetated sites, the soil loss estimates from the USLE have been higher than field measured values. Further work is being done both to evaluate the effectiveness of the USLE on rangeland and to identify corrections to the equation to make it more effective for use on rangeland.

For the purpose of this MSA, values given for soil loss from lands in the resource area assume about 70 percent cover in the USLE. This cover is assumed even for arid rangeland with less than 8 inches average annual precipitation. This cover is assumed to consist of vegetation, litter, rock fragments, and cryptogamic cover. At present no provision is made in the USLE for cryptogams, either as to density or as to their degree of development. This value has been used to estimate total loss of sediment from the site.

Soil loss from disturbed areas is estimated using a cover factor of 1.0 in the equation for the initial year. The only adjustment made is for areas high in rock fragments where rock fragments are expected to remain on the surface after disturbance.

Different grazing levels and season of use can be expected to have an effect on the soil surface. Heavy use in an area can be expected to substantially reduce the vegetative cover including cryptogams. Trampling on soils high in silts and clays can also be expected to cause compaction and reduce the permeability of these soils. This will tend to increase runoff and erosion from the area that is heavily grazed. One of the areas where the results of these effects can be observed is in the affected drainages. Increased runoff will encourage downcutting.

Badland and gypsumland comprise about 19,000 acres of the resource area. These miscellaneous land types are generally highly dissected with steep slopes and numerous small drainages. They are on areas of slightly saline shales with an electrical conductivity of 4 to 16 mmhos/cm. Sediment carried off these areas can be expected to range from 5 to 50 tons per acre per year for a period of 1 to 3 years, depending on any cuts or fills made.

About 38,000 acres of the resource area contain soils that are nonsaline or slightly saline (4 to 16 mmhos/cm) and are subject to erosion. About 6,000 acres of these soils are along drainage channels and stream terraces under black greasewood and Tamarask. The ramaining 32,000 acres are on sloping terrain and are associated with shales high in gypsum or other salts. Soil loss and sediment yield from these areas are estimated to range from 0.2 to 4 tons per acre per year. Disturbance on these soils could increase sediment production from 1 to 20 tons per acre per year.

APPENDIX 4340-B

Summary of Bucket Canyon Water Quality Problems

Samples were taken of produced water from the Aneth plant; from well water used for mixing with the produced water; from a spring in section 25; from the injection well Alpha A-313; and from two springs in section 13 near well 413. These sources were sampled April 19 to April 23, 1984, and the samples were analyzed by Ford Chemical Laboratory and USGS water laboratory in Reston, Virginia.

The results from these analyses showed a similarity in concentrations of calcium chloride between the injection water and the saline spring. The spring showed abnormally high levels of calcium chloride. Bryant Kimbol of the USGS Colorado District Office, Denver, indicates that it shows a relationship between the injection water and the saline springs. A report from his office should be forthcoming.

APPENDIX 4340-C

CLEAN AIR ACT REQUIREMENTS

The Clean Air Act of 1963, as amended in 1970 and 1977, establishes a national air quality program aimed at not only improving air quality in places where the air is relatively dirty, but also preventing serious degradation of air quality where the air is relatively clean.

To achieve these goals, the EPA has established a related set of regulations providing for various standards. These standards are as follows.

STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Under the NAAQS which were promulgated April 30, 1971, two sets of criteria (the primary and secondary standards) were established for the pollutants believed to affect health and the enjoyment of life. The primary standards protect the health of all segments of the population, including an adequate margin of safety, and are given priority. The secondary standards are stricter criteria, used to protect plants, soil, water, animals, and other features significant to the enjoyment of life.

Areas where the NAAQs for sulfur oxides and/or TSP are pervasively exceeded are exempted from these class designations. Such areas are said to be nonattainment areas and are regulated under nonattainment regulations to bring pollutant levels within NAAQS. NAAQS are shown in table 4340-14

Standards are written as specific pollutant concentrations for various averaging times (e.g., 1-hour exposure, etc.). Other than the standard for ozone, or those based on annual averages, the standards are not to be exceeded more than once per year. The air quality impact evaluation must address the maximum concentration of a particular pollutant (averaged over a specific time interval) that will not be exceeded more than once per year.

PREVENTION OF SIGNIFICANT DETERIORATION STANDARDS

In 1974, the EPA issued regulations to prevent significant deterioration of air quality under the 1970 version of the Clean Air Act. These regulations established a plan to protect areas that possess air quality which is cleaner than the NAAQS, by designating clean air areas as one of three classes. Specified numerical increments of air pollution increases from major satationary sources are permitted for each class, up to a level considered to be significant for that area. Class I provides extraordinary protection from air quality deterioration and permits only minor increases in air pollution levels. Under this concept, virtually any increase in air pollution in the above pristine areas would be considered significant. Class II increments permit increases in air pollution levels such as would usually accompany well-controlled growth. Class III increments permit increases in air pollution levels up to the NAAQS. PSD increments are given in table 4340-12.

The PSD increments are not applicable to Class II areas until a new major source or modification of an existing source of pollution submits a completed PSD permit application, which initiates the determination of a baseline concentration. Only that portion considered in the baseline area is subject to the PSD increments. As of December 1984, neither a baseline date, baseline concentration, nor baseline area has been established within the resource area. Consequently, the PSD Class II increments are not applicable to the SJRA at this time.

If the PSD increments have been triggered at the time of a permit application, the State of Utah will have to ensure that the action would not cause or contribute to a violation of PSD increments. This could be accomplished by requiring more stringent fugitive emission controls, additional control technology, alternative siting, or more stringent controls on nonproject sources.

Facilities developed in Utah must file a notice of intent and must receive an order from the Executive Secretary of the Air Conservation Committee permitting the proposed development.

The PSD requirements of 1974 applied only to two pollutants: TSP and SO_2. However, Section 166 of the Clean Air Act required EPA to promulgate PSD regulations by August 7, 1980 addressing nitrogen oxides, hydrocarbons, carbon monoxide, and photochemical oxidants, utilizing increments or other effective control strategies. For these additional pollutants, states may adopt nonincrement control strategies which, if taken as a whole, accomplish the purposes of PSD policy set forth in Section 160.

A control strategy for these additional pollutants has been made a part of a PSD review, during which ambient air quality modeling is required for each pollutant whose emission rate is above a certain level (the de minimis level). The pollutants of concern and their corresponding significant, or de minimis, emission levels are presented in table 4340-15.

Section 162 of the Clean Air Act designated all international parks, national memorial parks and then-existing national wilderness areas exceeding 5,000 acres, and national parks exceeding 6,000 acres, as Class I areas. These areas, 158 in all, may not be redesignated to another class through state or administrative action. The remaining areas of the country are initially designated as Class II. Section 164 of the Act provides that national monuments, national preserves, national primitive areas, national wild and scenic rivers, national wildlife refuges, national seashores and lakeshores, and new national park and wilderness areas established after August 7, 1977 are ineligible for redesignation to Class III if they are over 10,000 acres.

The act places the responsibility for the redesignation process with the states. The Secretary of the Department with authority over such lands may recommend redesignation to the appropriate state, or propose that Congress legislatively redesignate areas.

In order for Congress to redesignate areas, legislation would be proposed. This would probably involve the normal legislative process of committee hearings, floor debate, and action. In order for a state to redesignate areas, the detailed process outlined in Section 164(d) would be followed. This would include an analysis of the health, environmental, economic, social, and energy effects of the proposed redesignation, to be followed by a public hearing.

Section 164(d) also directed review of all NMs, PAs, and national reserves and recommendation of any appropriate areas for redesignation as Class I where AQRVs are important attributes of the area. The Act places the responsibility for the redesignation process with the states. The federal department may recommend redesignation to the appropriate state or propose that Congress legislatively redesignate areas.

Class I status protects air quality values by requiring that any new major emitting facility (generally a large point source of air pollution) in the vicinity be built in such a way and place so as to ensure no adverse impact on the Class I AQRVs.

AIR QUALITY RELATED VALUES

While the PSD increments for SO_2 and TSP are uniformly applicable in each of the classes of land, the Clean Air Act also contains provisions for determining on a case-by-case basis the extent to which a proposed deterioration in a mandatory Class I area is significant. A proposed degradation (such as impacts from tar sand development) is to be judged by taking into account the AQRVs that are important to the specific Class I area, whether or not the SO_2 or TSP increments are exceeded. AQRVs include odors, acid deposition, effects on ecological systems, and visibility.

Currently there are no objective criteria for judging the impact on AQRVs other than visibility. Only visibility impairment is discussed in detail, since significance criteria and pertinent information are lacking for other AQRVs.

Included in the PSD regulations is a visibility analysis guideline document. This guideline outlines three different levels of analysis. Level 1 is very conservative. If a level 1 analysis is met, a level 2 analysis must be completed. Levels 2 and 3 require progressively more site-specific and detailed data to assess the degree of visibility impairment. EPA has recommended criteria for a level 1 visibility analysis. These criteria state that impacts may be significant when C1, C2, and C3 are greater than 0.1, where C1 is plume contrast against the sky; C2 is plume contrast against dark terrain; and C3 is regional reduction in sky/terrain contrast.

The PSD visibility regulations discussed so far deal only with areas contained within Class I areas. The State of Utah is required to develop rules outlining a visibility protection and monitoring program for the entire state. This will include requirements for siting new industries in the state as well as any major modifications to existing industrial facilities which may affect the air quality.

The state must develop a visibiliity SIP, or EPA will make one for the state. Utah just completed its scheduled scoping meetings on November 14, 1984 prior to establishing draft regulations that will be a part of the SIP.

The state must have this visibility SIP to EPA by May 6, 1985. The SIP will only consider visibility only as a part of new source review procedures and monitoring for measuring visibility with the May 6 submission. Site-specific monitoring requirements will be assigned to the applicant desiring a state air quality permit. This May 6 SIP will again deal only with visibility within existing Class I areas.

The state must address visibility for the entire state by December 9, 1986. By June 10, 1986 they must have listed integral vista designations and decided on levels of protection for those areas. The state must consider, in the SIP, any integral vistas presented to them by the Secretary of a Federal Department by December 31, 1985 (Bill Wagner, Natural Resource Specialist, Utah State BLM office, personal communication, January 1985). Integral vista designations refer to view areas that extend beyond the boundary of pristine lands and that are considered valuable and important assets to the land from which they are being viewed.

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

Also part of the Clean Air Act are the National Emission Standards for Hazardous Air Pollutants. Under the Act, EPA designates and sets emission standards for hazardous air pollutants. To date (January 1984) only seven chemicals have been designated as hazardous air pollutants: asbestos, beryllium, mercury, vinyl chloride, benzene, radionuclides, and inorganic arsenic.

OTHER CONSIDERATIONS

EPA is currently considering the adoption of an air quality standard for IP, which are a subset of the current particles included in the TSP standard. The IP particles have diameters in the low end of the range of those now considered under TSP. This EPA-proposed action could have considerable implications for all fugitive emission sources, including surface mining of tar sand, since mining emissions typically consist of larger particulates.

If the current TSP standards are revised to exclude the larger particles, then one very significant criterion for judging the impact of dust emitting operations would certainly change. It is not possible at this time to determine how the proposed IP standard would affect these activities. This cannot be ascertained until the magnitude of the standard is set and the size fraction of the IPs determined. Similarly, the emission factors used to establish emissions from specific operations would have to be revised to estimate IP-sized particles, not TSP-sized particles.

4350 WILDLIFE HABITAT MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Refer to Wildlife, Part I.

RESOURCE OVERVIEW

Habitat discussion will be limited to major terrestrial species (desert bighorn sheep, pronghorn antelope, and deer); riparian habitat; and threatened and endangered species (bald eagle, black-footed ferret, peregrine falcon, and certain fish) (cross-reference: Wildlife, Part I).

Major Terrestrial Species Habitats

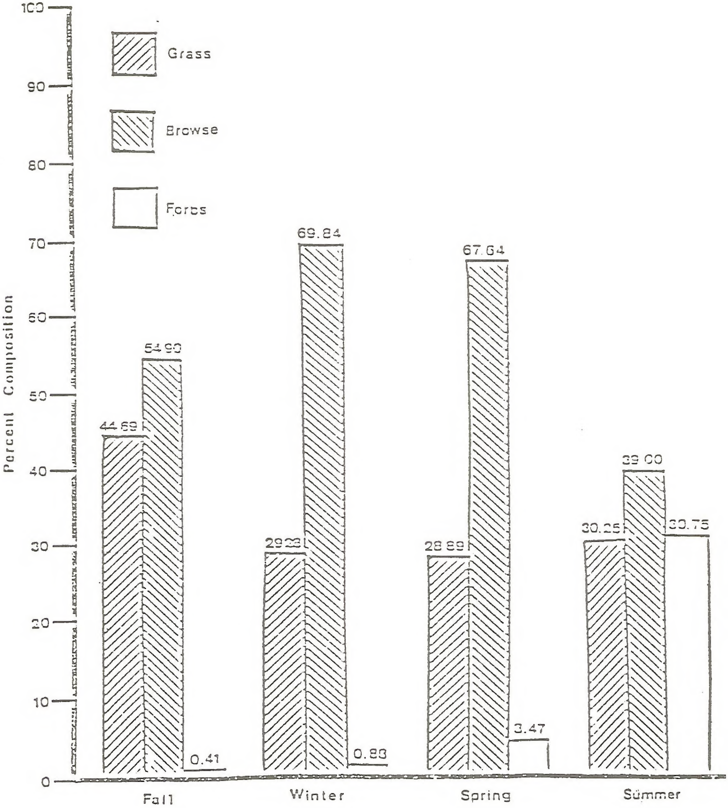
Desert Bighorn Sheep Habitat

Bighorn sheep inhabit about 1,002,300 acres in the south, southwest, and northwest portions of the resource area (see the Wildlife Habitat: Bighorn/Antelope/Ferret overlay). This figure includes 672,550 acres of yearlong habitat and 329,750 acres of crucial habitat on BLM managed lands. When NPS lands are included, the total habitat area is 1,320,600 acres (845,700 yearlong and 474,900 crucial). These acreages were calculated through the cooperative efforts of UDWR and BLM personnel. Table 4322-1 in the Grazing Management chapter shows the estimated number of bighorn sheep residing on BLM grazing allotments, their season of use, and the acres considered to be crucial habitat within each allotment.

Blackbrush, galleta, cliffrose, and cheatgrass are key forage species for bighorn sheep (King and Workman, 1983) (cross-reference: Vegetation, Part I). Forage utilization varies from year to year and from season to season (see figure 4350-1). Browse is most important in all seasons, and grass becomes more important in summer and fall. Figure 4350-2 shows the percentage of each forage class in the diets of cattle and bighorn sheep during the grazing season.

Water can be a limiting factor to bighorn sheep populations (King and Workman, 1983).

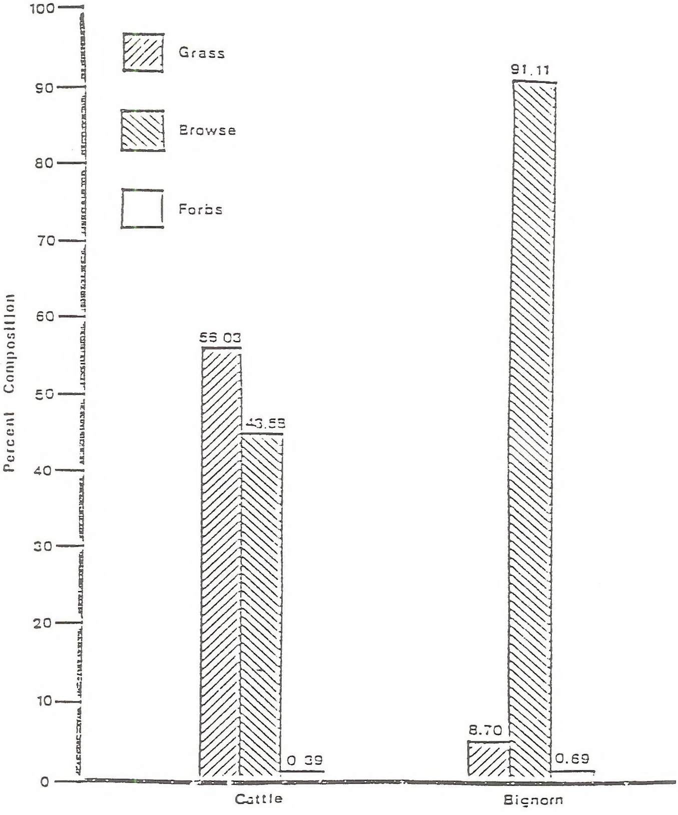
Crucial bighorn sheep habitat consists of areas that are used for rutting and lambing. Crucial wildlife habitat acreages for all species by allotment are shown in table 4322-1 in the Grazing Management chapter. Bighorn sheep breeding grounds require protection from October 15 through December 31, and lambing grounds between April 1 and July 15. These areas are shown on the Wildlife Habitat: Bighorn/Antelope/Ferret overlay.



Source: King and Workman, 1983.

FIGURE 4350-1

Seasonal Variation in Percent Composition of Forage Class in Desert Bighorn Diets



Source: King and Workman, 1983.

FIGURE 4350-2

Percentage of Forage Class in Diets of Cattle and Bighorn During Grazing Season

Pronghorn Antelope Habitat

The antelope within the Dry Valley portion of the resource area occupy approximately 37,300 habitat acres and are part of the Hatch Point antelope herd (Unit 12 - Hatch Point). This herd was established in 1971 when 172 antelope were trapped at Lusk, Wyoming and Lucerne Valley, Utah and transported to the Hatch Point area for release (Jense, et al., 1984). Antelope did not inhabit this area before 1971. Current (1984) distribution by grazing allotment is shown in table 4350-1.

Browse plants such as sagebrush, fourwing saltbush, and other suitable species including buffaloberry are limited in the Dry Valley area (cross-reference: Vegetation, Part I). There appear to be sufficient amounts of new succulent growth of preferred grass species to provide good early spring forage; however, forb production or availability is probably below potential. Globemallow and fleabane are important summer food sources. Water is limited.

The fawning area (approximately 12,960 acres) identified on the Wildlife Habitat: Bighorn/Antelope/Ferret overlay is crucial habitat. On good antelope range, fawns can be expected to gain one-half pound per day.

Deer Habitat

The SJRA contains two deer herd units: 31A, San Juan-Blue Mountain and 31B, San Juan-Elk Ridge.

A very small population of deer inhabit some portions of the SJRA yearlong. See table 4322-1 in the Grazing Management chapter for population numbers and season of use by allotment.

As shown on the Wildlife Habitat: Deer/Aquatic/Riparian overlay, the two herd units occupy a total of about 1,839,000 acres, of which 1,616,400 acres are winter range and 222,700 acres are summer range. Of this total, approximately 979,300 acres of winter range and 1,000 acres of summer range fall on BLM administered lands. These acreages were calculated through cooperative efforts of UDWR and BLM personnel. See table 4350-2 for range area and ownership.

Deer have always occupied their present range. Winter habitat for deer is found in 7 geographic areas which cover 18 grazing allotments in the resource area (see table 4350-3). All of these areas have high concentrations of deer during the winter. The upper limit of the winter range for both herd units is an elevation of about 8,000 feet; during a normal winter, deer tend to congregate around the 7,000-foot level.

Summer habit for small numbers of deer is found in two geographic areas adjacent to the Manti-LaSal National Forest, which cover a small portion (1,000 acres total) of the Indian Creek and Blue Mountain grazing allotments. Mule deer winter range is composed of sagebrush, pinyon-juniper, and

TABLE 4350-1

Estimated Current Antelope Population and Trend by Allotment

Grazing Allotment	Estimated Current Population	Trend
Lone Cedar	2	Decreasing
Tank Draw	18	Decreasing
Hart Draw	1	Decreasing
Mail Station	23	Decreasing
Dry Valley-Deer Neck	2	Decreasing
Church Rock	4	Decreasing
TOTAL	50	

NOTE: The total estimated prior stable population of 309 includes the entire Hatch Point herd, part of which is in Grand Resource Area. The prior stable population has not been estimated for each allotment.

Source: Population estimates were derived through cooperative efforts of UDWR and BLM personnel.

TABLE 4350-2

Ownership and Management Responsibility for Deer Habitat

Deer Herd Unit 31a, San Juan-Blue Mountain, Range Area and Approximate Ownership

Ownership	Summer Range Area (acres)	Summer Range %	Winter Range Area (acres)	Winter Range %
Forest Service	95,900	98	69,100	8
Bureau of Land Management			465,800	52
Private	2,100	2	298,400	33
State			58,900	7
Total	98,000		892,200	

*Surveyed 1967; F. & G. Bull. 68-2.

Deer Herd Unit 31b, San Juan-Elk Ridge, Range Area and Approximate Ownership

Ownership	Summer Range Area (acres)	Summer Range %	Winter Range Area (acres)	Winter Range %
Forest Service	123,500	99	83,600	12
Bureau of Land Management	1,000	1	513,500	70
Private	200	1	4,200	1
State			69,300	10
National Park and Monuments			53,600	7
Total	124,700		724,200	

*Surveyed 1967; F. & G. Bull. 68-2

Source: Jense, et al., 1984.

TABLE 4350-3

Primary Deer Wintering Areas

Geographic Area	Allotment Name
Beef Basin	Indian Creek
Salt Creek Mesa	Indian Creek
Dark Canyon Plateau	Indian Creek
Black Mesa	Tank Bench-Brushy Basin-White Mesa
Grand Flat-Harmony Flat	Lake Canyon
Hart Point-Hart Draw	Hart Point
	Hart Draw
	Lone Cedar
Montezuma-Alkali Point	Verdure Creek
	Montezuma Canyon
	Pearson Point
	Horsehead Canyon
	Monument Canyon
	Cave Canyon
	Little Boulder
	Alkali Canyon
	Alkali Point
	Cross Canyon
	Bug-Squaw

NOTE: Affected acreages for each allotment are shown in table 4322-1 in the Grazing Management chapter. Information is based on cooperative efforts of BLM and UDWR personnel.

cultivated farmland, primarily planted with beans and wheat (cross-reference: Vegetation, Part I). Because BLM managed lands in the SJRA provide only 1 percent of the summer habitat used by deer, summer forage is not discussed here.

Studies in many of the Western States over the past 25 to 30 years have shown that mule deer are selective feeders; their diet depends upon the time of year, weather, and plant growth and condition. Another important factor is the food available and its abundance and variety. Mule deer are not strictly browers, nor are they grazers; they can be considered opportunistic feeders (Smith, 1976).

Deer prefer browse and forbs to grasses; however, grasses constitute an important part of their diet during the spring, late fall, and winter on ranges where snowfall is light. During these periods, grasses are practically the only green and succulent forage available.

Perrenial and annual grasses, when actively growing, have a high concentration of protein, mineral content, and water, and are low in crude fiber. They are the first type of vegetation to green out and make up a good portion of deer diets when green and succulent. Fall green out can occur when moisture conditions are right, and deer have been observed moving from a browse-forb diet to a diet of grasses (Smith, 1976).

Mule deer need a growing ration that contains at least 10 percent crude protein, and a maintenance ration that is 7 or 8 percent crude protein. Anything below 5 percent will cause a critical protein deficiency in the animal (Smith, 1976).

As a plant matures, its crude fiber and carbohydrates increase, while its protein declines. As protein entering the diet decreases and extra energy is needed because of cold temperatures, winds, and snow, the deer must utilize stored energy and protein. Over the winter, deer normally lose 10 to 20 percent of their autumn weight, and 30 percent appears to be the maximum loss they can survive.

Weight loss is related to utilization of body proteins. The gradual increase of grass in mule deer diets, along with the use of a variety of other foods during late winter and early spring, provides a suitable source of badly needed protein. This protein is necessary for growth in body size and weight, antler development, fawning, and nursing. The increase of grass consumption in the spring reflects the selectivity of mule deer in relation to their nutritional needs (Smith, 1976).

The Unit 31A winter ranges are in good condition (Jense, et al., 1984). UDWR, BLM, and USFS personnel conduct browse utilization and pellet group studies on deer use areas each year to discover habitat problems, such as overutilization or deterioration of browse species, before serious habitat damage occurs. Browse utilization by deer in 1984 was light to moderate in most areas.

Sagebrush utilization in the northern portions of Hart Draw, however, showed heavy use. See table 4350-4 for pellet group trends. Pellet group counts indicate how much the wintering deer are using the area. Utilization studies show how much of the browse plants have been eaten. Apparently, as the population increases, deer are concentrating in this area during the winter. Similar trends in deer use have not been observed in the southern portion of Harts Draw nor in other winter ranges within the herd unit (Jense, et al., 1984).

Deer use was generally higher on most transects in Unit 31B (table 4350-2), but a drop in use was observed in Beef Basin in 1983-1984. This may be attributed to a milder winter, which allowed better distribution of deer over the range.

Sagebrush utilization at Black Mesa was light, but mountain mahogany and cliffrose were heavily utilized along the cliff rim and showed little or no regeneration. However, the carrying capacity on both ranges remains higher than the deer population (Jense, et al., 1984).

Water is not an important consideration for wintering deer in the resource area. Most of their water is obtained from snowmelt and the moisture content of the vegetation.

Seven areas have been identified as crucial habitat for deer (see the Wildlife Habitat: Deer/Aquatic/Riparian overlay). These areas are crucial because large populations of deer congregate on them during the winter. For all of these areas, the trend is stable.

There is ample cover for deer. Extensive stands of pinyon-juniper on the winter ranges provide excellent thermal and escape cover. The existing pinyon-juniper stands are stable to increasing in trend.

Riparian and Aquatic Habitat

Streams, water courses, and rivers on public lands in the SJRA total about 480 miles. This excludes the Colorado River, which borders the resource area. Both the Colorado and portions of the San Juan River flow across lands administered by the NPS. A portion of the San Juan River flows across the Navajo Indian reservation. These riparian areas are not administered by the BLM and are not discussed in this section. The portion of the San Juan River bordering BLM administered lands accounts for 51 miles of the total. Waterways are shown on the Wildlife Habitat: Deer/Aquatic/Riparian overlay (cross-reference: Water, Part I).

Riparian areas are important wildlife habitat for many species. Riparian areas generally offer all four major habitat components: food, water, cover, and living space. The available water and deeper soils increase production of both plant and animal biomass. The contrast with surrounding vegetation increases habitat diversity, and the linear shape of a riparian area increases the ecotone ("edge") between the contrasting vegetation types. Differing

TABLE 4350-4

Pellet Group Trend by Herd Unit

Deer Herd Unit 31a, San Juan-Blue Mountain

Transect (Elevation)	Deer Days Use/Hectare					
	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
South Mustang (PS) (5,800)	38	6	0	2	2	5
Alkali Ridge (PS) (6,200)	258	106	54	60	132	106
Hart's Draw (PS) (6,600)	201	106	26	271	220	258
Hart's Draw (PS)-Artr (6,600)	0	22	11	8	25	12
Brushy Basin (PS) (7,100)	21	6	12	3	22	8
Peter's Point (PS) (Out) (7,800)	15	35	22	45	42	35
Cedar Point					62	190
Average	89	47	25	65	65	78

Deer Herd Unit 31b, San Juan-Elk Ridge

Transect (Elevation)	Deer Days Use/Hectare					
	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
West Rim Comb Wash (5,600)	2	0	3	2	14	12
Black Mesa (5,700)	42	55	9	20	31	38
Baullies Reseeding (5,800)	18	8	3	5	14	17
E. Rim Cottonwood (6,000)	3	5	2	0	3	2
Blanding Kigalia (6,300)	3	5	2	--	0	0
Beef Basin (6,400)	132	32	75	234	390	218
Harmony Flat (6,600)	112	11	6	6	26	25
Texas Flat (6,600)	12	2	8	3	2	14
Lower Lost Park (6,700)	23	0	2	0	34	23
Salt Creek Mesa (7,000)	25	0	6	26	20	17
Milk Ranch Point (7,200)	11	0	0	8	2	
Deer Flat (7,900)	14	2	0	0	6	20
Average	32	10	10	28	63	35

Source: Jense, et al., 1984.

combinations of increased humidity, transpiration, vegetation height, shading, and air drainages produce varied microclimates. Linear riparian zones serve as connectors between habitat types and provide travel lanes for wildlife.

Riparian habitats are also preferred by livestock because they provide readily available water, palatable vegetation, usually gentler sloping terrain, shade for cooler temperatures during the summer, and shelter for thermal cover during the winter.

The riparian zones in the resource area (shown on the Wildlife Habitat: Deer/Aquatic/Riparian overlay) are listed in table 4350-5. The condition of the riparian habitat has not been measured throughout the resource area.

It should be noted that riparian areas in good to excellent condition (relatively undisturbed) support far greater populations and far more species of wildlife than do similar areas in poor or fair condition.

Not all riparian areas listed support an aquatic habitat. Permanent pools occur intermittently along all drainages listed, and perennial streams also provide a permanent aquatic habitat. Conversely, not all permanent or intermittent streams have developed riparian vegetation, because of stream cuts through slickrock.

Threatened and Endangered Species Habitat

Bald Eagle Habitat

The resource area provides habitat for bald eagles only in the winter. Bald eagles arrive during October and November and depart by March or April. Half of the observations in the resource area were in Cottonwood Wash; some eagles were also seen along the San Juan River and in Montezuma Creek (FWS, 1983).

Eagles probably rely on carcasses of domestic livestock, deer, and other mammals while actively capturing jackrabbits, mergansers, and mallards (FWS, 1983).

Stands of cottonwood trees along riparian areas are crucial to bald eagles wintering in the resource area. The trees are needed as nocturnal roosts and perches from which to forage for mammals and waterfowl.

Black-Footed Ferret Habitat

There has been no conclusive evidence that black-footed ferrets inhabit the resource area. Since the ferret's primary food source is the prairie dog, approximately 2,211 acres of prairie dog colonies have been mapped and searched for black-footed ferrets (FWS, 1983).

TABLE 4350-5

Riparian and Aquatic Habitat Areas

Name of Area	Total Miles	BLM Miles	Allotment	Conflicts				
				L	O	R	M	A
San Juan River	58	49	Perkins Brothers	X	X	X	X	X
McCracken Canyon	3	3	McCracken					
Montezuma Canyon Drainage								
Cross Canyon	16	7	Cross Canyon	X		X	X	
Montezuma Creek	42	14	Cave Canyon Montezuma Little Boulder	X			X	X
Monument Creek	16	15	Monument Canyon	X		X	X	X
Coal Bed Canyon	16	13	Monument Canyon Montezuma	X		X	X	X
Devil Canyon	15	12	Devil Canyon Montezuma					
Recapture Creek Drainage								
Recapture Creek	31	24	East League White Mesa Bull Dog Alkali Canyon	X	X	X	X	X
Cottonwood Creek	49	29	Tank-Bench Brushy Basin White Mesa	X	X	X	X	
Butler Wash Drainage								
Butler Wash	24	21	Tank-Bench Brushy Basin White Mesa Perkins Brothers	X	X	X	X	
Comb Wash Drainage								
Comb Wash	30	25	Perkins Brothers Comb Wash Texas-Muley	X	X	X	X	
Road Canyon, North Fork	8	7	Comb Wash Perkins Brothers	X			X	
Road Canyon, South Fork	6	4	Comb Wash Perkins Brothers	X	X	X	X	
Fish Creek, North Fork	15	14	Slickhorn Comb Wash	X				
Fish Creek, South Fork	15	14	Slickhorn Comb Wash	X		X	X	

Name of Area	Total Miles	BLM Miles	Allotment	Conflicts				
				L	O	R	M	A
Owl Creek	8	8	Comb Wash Slickhorn					
Dry Wash	3	2	Comb Wash	X				
Mule Canyon, South Fork	8	4	Comb Wash	X	X		X	
Mule Canyon, North Fork	9	6	Comb Wash Texas-Muley	X				
Arch Canyon	8	7	Comb Wash	X	X	X	X	
Lime Creek Drainage								
Lime Creek	5	5	Perkins Brothers	X		X	X	
Grand Gulch Drainage								
Grand Gulch	30	30	Slickhorn Lake Canyon					
Bullet Canyon	2	2	Slickhorn					
Kane Creek	4	3	Lake Canyon	X	X	X	X	
Clay Hills Canyon								
Unnamed Creek	4	3	Lake Canyon	X		X	X	
Lake Canyon Drainage								
Lake Canyon	2	1	Lake Canyon	X			X	
Moki Canyon Drainage								
Moki Canyon	5	2	Lake Canyon	X		X	X	
Dark Canyon Drainage								
Dark Canyon	9	9	Indian Creek					
Gypsum Canyon Drainage								
Gypsum Canyon	5	5	Indian Creek	X				
Fable Valley	7	7	Indian Creek	X				
Indian Creek Drainage								
Indian Creek	44	34	Indian Creek Hart Draw	X	X	X	X	X
Davis Canyon	4	3	Indian Creek	X	X	X	X	
Lavender Canyon	10	8	Indian Creek					
Cottonwood Creek	11	7	Indian Creek	X	X	X	X	X
Titus Canyon	6	3	Indian Creek					
Hart Draw	24	21	Hart Draw					
Lockhart Canyon Drainage								
Lockhart Creek	8	5	Hart Draw	X	X	X	X	

Name of Area	Total Miles	BLM Miles	Allotment	Conflicts				
				L	O	R	M	A
East Canyon Drainage				X		X	X	
East Canyon Wash	17	13	Monticello Cowboy East Canyon					
Big Indian Wash	9	8	Big Indian Indian Rock	X		X	X	
Peters Canyon	14	5	Peters Point Monticello Cowboy Hart Draw	X		X	X	
Colorado River	14	14	Hurrah Pass	X				
Red Canyon	19	15	Lake Canyon	X		X	X	
Totals:	633	481						

Key: L=Livestock Grazing; O=ORV Use; R=Road Construction; M=Mineral Development; A=Agriculture Irrigation Source.

Peregrine Falcon Habitat

No peregrine falcons or nest sites have been confirmed within the SJRA. A survey of the resource area was made by FWS in 1983, and no peregrine falcons or eyries were discovered on public lands within the resource area; however, two eyries have been located on adjacent USFS lands and in CNP. The resource area does, however, contain suitable habitat for peregrine falcons. Limited access to some parts of the resource area and the small number of intensive surveys conducted could be the reasons that no nest sites have been located.

The canyons of Grand Gulch offer the best potential habitat of any surveyed parts of the resource area. Canyon walls more than 500 feet high are common throughout Grand Gulch. A zoology instructor from California reported seeing a peregrine falcon in Grand Gulch in 1982. Although the sighting was unconfirmed, the area was closely examined for peregrine activity.

Peregrine falcons normally defend their territories from intrusion by making aerial attacks on other raptors. When kestrels, red-tailed hawks, prairie falcons, and a golden eagle were observed flying in Dark Canyon, it was expected that their flights would solicit aerial attacks from any peregrine falcons that might be present, but this did not occur.

Peregrines typically select nest sites within a mile of a reliable water source. The Grand Gulch area could conceivably support a pair of peregrines because the habitat is ideal except for the limited water supply.

Native Fish Species Habitat

The San Juan River is historical range for three endangered species (humpback chub, bonytail chub, and Colorado squawfish) and one sensitive species (the humpback sucker). The humpback and bonytail chubs may still be present, although they have not been reported in recent years. A Colorado squawfish was caught in a seine near Mexican Hat, Utah in 1978, and humpback suckers were found in an irrigation pond near Bluff, Utah in 1976 (Kjeldgaard, 1981).

The Colorado River system, including the San Juan River, has been a naturally harsh environment. Its flow levels fluctuate widely, its temperatures range from near freezing to over 90 degrees F, it carries heavy sediment loads after spring thunderstorms, and it has periods of high salinity. Only a few native species of fish have been able to adapt to these conditions. The endangered and sensitive species listed above are among these few.

It is not known what food sources are used by these species in the San Juan River.

The fish are confined to the San Juan and Colorado Rivers. Specialized habitat requirements are unknown.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

Federal Laws

FLPMA recognizes wildlife as one of the six principal land uses, requires consideration of wildlife objectives in commodity-oriented programs, and authorizes use of range betterment funds for enhancement of habitat for fish and wildlife.

The Endangered Species Act of 1973, as amended, requires BLM to ensure that proposed actions do not jeopardize the continued existence of a threatened or endangered species nor cause its critical habitat to be modified or destroyed.

The Sikes Act of 1974, as amended, requires rehabilitation programs for fish and wildlife, including development of cooperative agreements with state fish and game agencies to carry out such plans. The act also provides for the protection of species listed by the state as threatened or endangered.

PRIA requires intensive rangeland maintenance and provides funding for rangeland improvements, including improvement of wildlife habitat.

The Bald Eagle Protection Act of 1940, as amended, establishes penalties for taking, possessing, selling, purchasing, or bartering bald and golden eagles. It also provides for cancellation of the lease, licenses, or other land use authorization of federal lands for anyone convicted of violating the act or any of its implementing regulations or permits.

The Clean Air Act of 1970 establishes the mechanism for control of air pollution for the public health and welfare, and recognizes wildlife as one aspect of the public welfare.

The Federal Water Pollution Control Act (Clean Water Act) of 1977 has as its objective the restoration and maintenance of the chemical, biological, and physical integrity of the nation's waters at a quality sufficient to protect fish and wildlife, as well as recreational use.

The Fish and Wildlife Coordination Act of 1958 mandates equal consideration of wildlife conservation with other features of water resource development programs and requires that damage to fish and wildlife resources be prevented, as well as that these resources be developed and improved.

The Migratory Bird Treaty Act of 1918, as amended, establishes federal responsibility for the protection of international migratory birds and authorizes the Secretary of the Interior, through the U.S. Fish and Wildlife Service, to regulate hunting of migratory birds.

The Taylor Grazing Act of 1934, as amended, requires cooperation with states and other groups interested in conservation and propagation of wildlife within the established grazing districts, and provides for fishing and hunting within those districts in accordance with applicable laws.

The Wild, Free-Roaming Horse and Burro Act of 1971 requires consultation with state wildlife agencies to protect the ecological balance of all wildlife species present, particularly those that are endangered, and requires that adjustments in forage allocations consider the needs of all wildlife species.

Other federal laws that may occasionally affect wildlife habitat management actions within the resource area are the Mineral Leasing Act, the Water Resources Planning Act, the Water Pollution Act, the Water Resources Development act, the Federal Grants and Cooperative Agreements Act, the Safe Drinking Water Act, the Fish and Wildlife Act, and the Soils and Water Resources Conservation Act.

Executive Orders

EO 11288 (July 1966) covered prevention, control, and abatement of water pollution by federal agencies; EO 11514 (March 1970) directed the protection and enhancement of environmental quality.

The following EOs deal with animal damage control: 11643 (February 1972), 11870 (July 1975), and 11917 (May 1976).

EO 11987 (May 1977) directs executive agencies to restrict the introduction of exotic species into natural ecosystems.

EO 11988 (May 1977) requires evaluation of potential effects of actions proposed within floodplains. It also directs federal agencies to reduce the risk of flood loss, minimize impacts of floods, and restore and preserve the natural and beneficial values of floodplains. Planning programs and budget requests must consider flood hazards and floodplain management.

EO 11989 (May 1977) recognizes wildlife and their habitat as one of the values to be protected through closure of certain areas to ORV use or through the limitation of ORV use in those areas.

EO 11990 (May 1977) directs federal agencies to minimize the destruction, degradation, and loss of wetlands and to preserve and enhance their beneficial values. All leases, rights-of-way, easements, and disposals involving federal wetlands must restrict uses by the grantee to be consistent with federal, state, and local wetland regulations.

Regulations

43 CFR 24	Recognizes the necessity of maintaining fish and wildlife resources for their scenic, scientific, recreational, and economic importance, as well as the need for state and federal governments to work in harmony to develop and utilize these resources.
43 CFR 4100	Includes improvement of fish and wildlife habitat as a basic part of range betterment; provides BLM grazing and trespass regulations; requires the reservation of sufficient habitat for wildlife; and recognizes wildlife habitat as one of the values that can be protected by closing certain areas to livestock use.

43 CFR 8340	Provides for limitation of ORV use to protect certain resource values, including wildlife and their habitat.

BLM Manual Sections

1737	Explains Bureau policy on fencing to avoid or minimize impacts to wildlife.
1785	Guides coordination between BLM and state and local governments.
4100	Explains BLM range management policy, provides livestock grazing regulations, and directs mitigation of some livestock-wildlife conflicts.
4412	Requires development of watering facilities to serve multiple purposes (big game, small game, waterfowl, and fish).
6500	Provides policy, guidance, and operating procedures for BLM's wildlife habitat management program.
6600	Guides determination of crucial habitat areas; explains integrated habitat inventory and classification system; provides methodology and requirements for wildlife inventories; guides management and development of wetlands and riparian habitat; provides methodology for aquatic inventories and water analyses.
6700	Provides BLM policy, guidance, and operating procedures for management of aquatic resources and protection of wetlands and riparian areas; guides development of HMPs.
6820	Establishes BLM policy and guidance for introduction of exotic wildlife species, transplanting native wildlife species, and re-establishing formerly indigenous species.
6840	Guides the use of BLM's authority to further the purpose of the Endangered Species Act and similar state laws.
7221	Provides policy, guidance, and direction for floodplain management.
7250	Provides policy and guidance regarding water rights.

Instruction Memorandums

77-290 Establishes BLM policy that:

(a) new watering facilities and extensions of existing facilities will not be established where new conflicts over vegetal resources would result;

(b) livestock water will be maintained for wildlife even when livestock are not present; and

(c) bird ramps in troughs, lateral watering sites off pipelines, overflows at troughs, and protected seep areas will be established for wildlife and wild horses and burros where the need is identified on existing and new improvements.

77-606	States that the objective of the range improvement program is to use structures, developments, and treatments in concert with management to rehabilitate, protect, and improve the public land and its resources; to arrest range deterioration; and to improve forage conditions, fish and wildlife habitat, watershed protection, and livestock production, all consistent with land use plans.
78-410	Provides policy and specific guidance on management and protection of wetland and riparian ecosystems.
79-391	Establishes BLM policy for wildlife inventory standards, levels, and reporting requirements and provides comprehensive guidance on both aquatic and terrestrial inventories.
80-225	Provides policy and law guidance on the requirements for fish and wildlife habitat protection and enhancement in the rangeland management program.
UT-77-130	Rabbit and rodent population estimates.
UT-77-174	Provides policy and guidelines for introductions and transplants of wildlife.
UT-80-36	Desert bighorn sheep introduction, supplemental and local cooperative agreements.
UT-80-186	Proposed list of endangered, threatened, and sensitive animal species on public lands in Utah.
UT-81-79	Identifies areas where bighorn sheep are to be introduced; supplemental cooperative agreement between UDWR and BLM on bighorn introductions.
UT-81-229	Coordination and consultation with UDWR regarding rangeland improvements.

Information Memorandums

UT-79-155	Managing riparian zones for fish and wildlife.
UT-79-179	Memorandum of understanding between BLM and UDWR concerning wildlife management on public lands.

Cooperative Agreements

BLM Agreement No. UT-91 (12/27/76). Sikes Act program plan agreement for the State of Utah between the BLM, FS, and UDWR (same as IM UT-76-443).

BLM Agreement No. UT-141 (9/19/78). Cooperative Agreement between the Governor of Utah and the State Director of BLM concerning joint identification, communication, and coordination of common concerns relating to the management of State and BLM administered lands and resources, and to provide a mechanism for continuing involvement in the development and revision of land use plans.

MOU between the UDWR and the Utah BLM (6/22/79) pursuant to the Cooperative Agreement between the Governor of Utah and the State Director of the Utah BLM (Agreement No. UT-141 of 9/19/78) and is a supplement to that agreement for the purpose of furthering State BLM cooperation in fish and wildlife management. (This is also known as UDWR Agreement No. 80-5135 and BLM IM UT-79-179 of 8/10/79.)

RESOURCE ALLOCATIONS

The BLM does not allocate use of wildlife resources. UDWR has established big game herd unit boundaries for deer, antelope, and bighorn sheep. These boundaries are used for both management and administrative purposes (all are shown on the Wildlife Habitat: Bighorn/Antelope/Ferret and Wildlife Habitat: Deer/Aquatic/Riparian overlays).

The BLM identifies crucial habitat areas and protects these areas while managing other resource uses. The types of management restrictions are defined through the RMP.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

BLM has responsibility to manage only the habitat for wildlife species, while UDWR manages the animals themselves.

Current management of wildlife habitat in SJRA has generally been limited to development of HMPs in certain areas and construction of habitat improvement facilities such as wildlife guzzlers and exclosures. The oil and gas categories, developed in 1975, have established areas to protect certain species (cross-reference: Existing Oil and Gas Leasing Categories overlay, Oil and Gas Leasing, Part II).

Use of wildlife resources is either consumptive (hunting or trapping) or nonconsumptive (observation or photography). Hunting is managed by UDWR; harvest figures are given for various species below.

Specific habitat management for particular species has been as follows.

Major Terrestrial Species Habitat

Desert Bighorn Sheep Habitat

Intensive studies of bighorn sheep began in 1965, with the first aerial surveys in 1969 (Jense, 1983). Two HMPs were developed in 1982 for the White Canyon-Red Canyon and Beef Basin areas.

Several transplants have been undertaken to move sheep from areas of surplus within the resource area into areas of good habitat outside the resource area where there are no sheep (UDWR, 1983). These transplants are summarized in table 4350-6.

Bighorn sheep are socially intolerant of domestic livestock. Most evidence of this is circumstantial: bighorn and cattle use different areas when on the same range (King and Workman, 1983). Bighorn tend to use the higher, steeper slopes, while cattle use the lower, gentler slopes and valley floors (see figures 4350-3, 4350-4, and 4350-5). Although the reasons for this separation are not known with certainty, bighorn sheep have been known to vacate parts of their ranges when livestock were introduced. Bates (1982) observed that, when cattle grazing was eliminated in CNP, bighorn sheep began to use areas they had previously not occupied.

Bighorn are sensitive to human intrusions. Human activity is not presently a problem on bighorn sheep habitat in the resource area. However, the area has potential for recreation and uranium mining.

The severity of bighorn response to vehicle traffic increases when the sheep are in small groups and as vehicles approach them more closely. In small groups, bighorn also respond more severely to disturbance from hikers (King and Workman, 1983).

Telemetry flights have been another source of disturbance to bighorn. In order to collect as much information as possible on group size, group composition, lamb to ewe ratios, etc., the plane circles at relatively low elevations for several minutes. Concern has been expressed that such a procedure may cause bighorn to leave the area of the flight. However, studies indicate (King and Workman, 1983) that bighorn harrassed by telementry flights moved only an average of 0.5 mile away.

This finding should not be taken to indicate that bighorn sheep would not be displaced by helicopter flights. If helicopter flights consisted only of several passes over an area, the effect on bighorn might be negligible; however, a helicopter hovering at low elevation could cause bighorn to abandon the area.

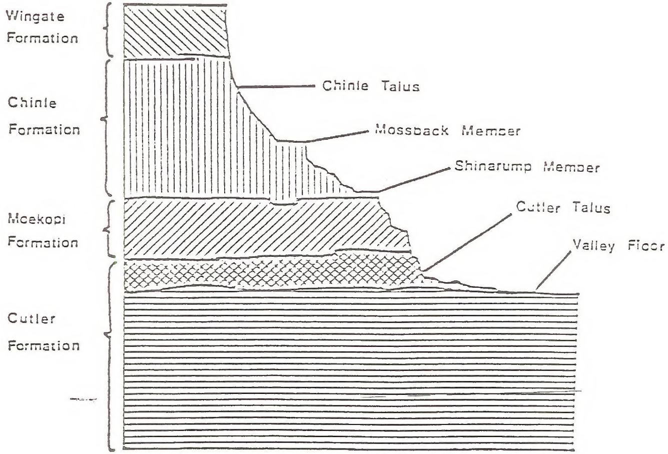
Development of water sources for bighorn in the resource area has consisted mainly of shoveling out seeps or springs, collecting the water in a clay basin or plastic apron, and piping the water to a small trough. Most of the water developments (see the Wildlife Habitat: Bighorn/Antelope/Ferret overlay) were accomplished in the late 1960s, but inspection and maintenance were infrequent over the next several years.

TABLE 4350-6

Summary of Bighorn Sheep Transplants in Southeastern Utah

Month and Year	Sheep Moved From		Sheep Moved To	
December 1975	4	Gypsum Canyon	4	East Moody Canyon
November 1976	12	Gypsum Canyon	12	East Moody Canyon
February 1978	7	Lake Powell (east side)	7	East Moody Canyon
December 1979	19	San Juan Unit	12	San Rafael Swell
			7	Westwater Canyon
January 1981	20	Cataract Canyon, Jacobs Chair, Found Mesa	20	Rock Creek drainage on Kaiparowits Plateau
January 1982	46	Canyonlands National Park	12	Kaiparowits Plateau
			11	San Rafael Swell
			23	The Maze
January 1983	12	Canyonlands National Park	12	San Rafael Swell near Iron Wash

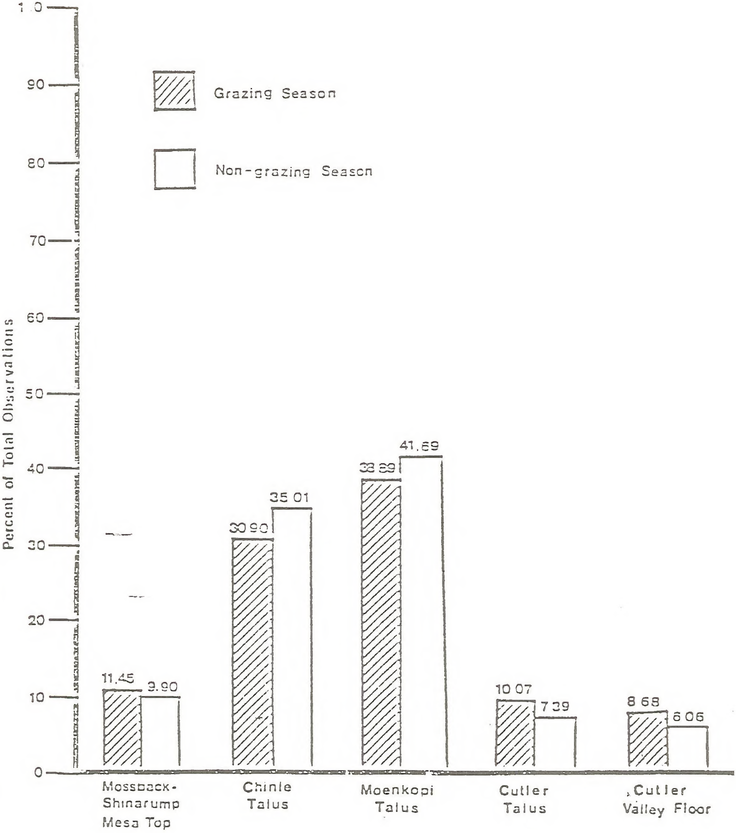
Source: Jense, 1983.


Wingate Formation
Chinle Formation
Moekopi Formation
Cutler Formation
Chinle Talus
Mossback Member
Shinarump Member
Cutler Talus
Valley Floor

Source: King and Workman, 1983.

FIGURE 4350-3

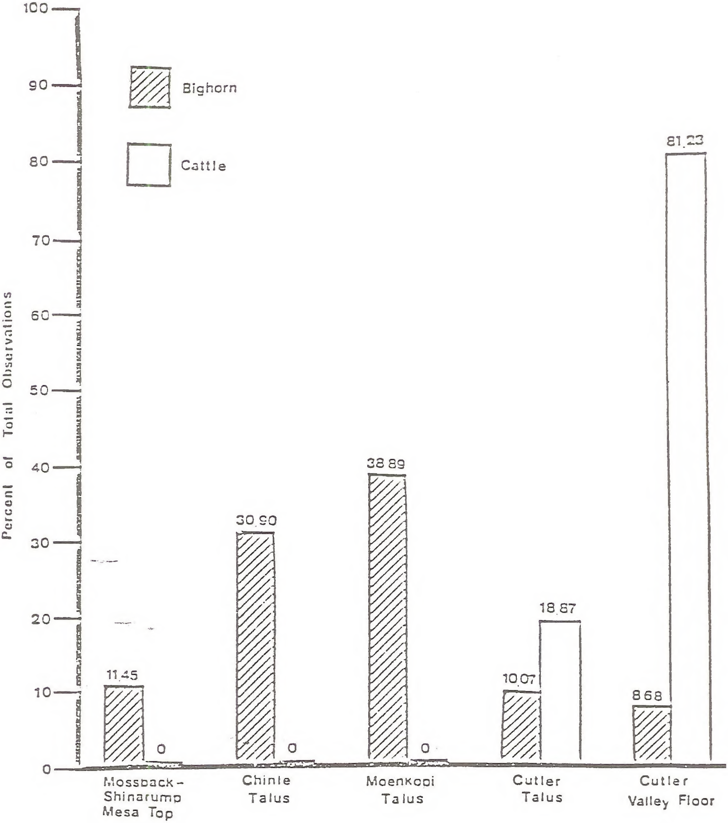
Generalized Topographic Types in the White Canyon Area



Source: King and Workman, 1983.

FIGURE 4350-4

Topographic Types Selected by Bighorn in White Canyon During Grazing and Nongrazing Seasons



Source: King and Workman, 1983.

FIGURE 4350-5

Topographic Types Selected by Bighorn and Cattle in White Canyon During Grazing Season

Regular inspection indicates whether a water source remains viable and if sheep are using the water. Lack of sheep sign can indicate that bighorn have abandoned the area. The presence of old sign at a water development can indicate that it is viable during at least part of the year.

All but one of the water developments have been inspected since 1979, and six or eight of them need maintenance. Water production at these areas varies from 0.5 to 45 gallons per hour. Very little sheep sign was found when the developments were inspected in 1979 and 1980. Old, gray sheep pellets were found at about half the developments.

The Jacob's Chair guzzler, constructed in 1981, was not used by bighorn sheep, possibly because the drinking basin was improperly located. During the summer of 1984 the trough was reconstructed as a concrete basin and moved approximately 150 yards to the edge of the mesa rim. Bighorn sheep are now (1984) using the guzzler.

In 1980 BLM filed with the State Engineer for water rights at 17 sources in the Red Canyon drainages (see table 4350-7). Other water sources for bighorn are listed in table 4350-8. In May of 1980 members of the Utah Bighorn Sheep Society volunteered to help maintain bighorn water developments. A maintenance schedule (table 4350-9) has been established to ensure that water developments for bighorn sheep remain viable.

The oil and gas leasing categories 2, 3, and 4 protect 114,262 acres of bighorn sheep breeding and lambing grounds.

Table 4350-10 summarizes harvest data since hunting of bighorn sheep was legalized in Utah in 1967. Hunting is administered by the Utah Board of Big Game Control. Numerous changes have taken place in the number of permits issued, the areas that could be hunted, and the cost of the permits. Until 1982, bighorn sheep in Utah were hunted only in the SJRA. Table 4350-11 summarizes harvest data for 1983, including hunting on the Potash herd unit, which is in the Grand Resource Area (Jense, 1983).

The Board of Big Game Control introduced the bid sale of one permit per year in 1980. This permit goes to the person submitting the highest sealed bid over the minimum of $20,000. Proceeds from the bid sales are used in Utah's desert bighorn sheep management program and have funded the bighorn transplants mentioned earlier. Bid sales have brought the following prices: $20,000 in 1980; $22,000 in 1981; $22,500 in 1982; and $32,000 in 1983 (Jense, 1983).

Most nonconsumptive use is incidental to other uses such as hiking, backpacking, or sightseeing. All of these activities take place year-round.

Pronghorn Antelope Habitat

The herd was introduced in 1971 (table 4350-12). A HMP was written for this herd in 1976. As a result, eight water developments have been established.

TABLE 4350-7

White Canyon Area Seeps and Springs for Which BLM has Filed for Water Rights

Source Name	Developed	Date of Last Inspection or Maintenance	Comments
1. Upper Blue Notch (T. 35S. R. 14E. S.12 NWSE)	Yes	July 80	Not flowing July 80
2. Tamarisk (T. 35S. R. 14E. S.14 NWNW)	Yes	Fall 79	Lots of sheep sign
3. Cottonwood (T. 35S. R. 14E. S.14 SWSE)	No	Fall 29	
4. Cottonwood 1 (T. 35S. R. 14E. S.13 SESW)	Yes	December 80	Good flow, no fresh sheep sign
5. Dripping (T. 35S. R. 14E. S.26 SENE)	Yes	December 80	Good flow, no fresh sheep sign
6. Upper Rainbow (T. 35S. R. 15E. S.30 SENE)	Yes	May 80	Could not find trough
7. Kerr (T. 35S. R. 15E. S.30 NWSE)	Yes	May 80	Good flow
8. Piute (T. 36S. R. 15E. S.8 SWSE)	Yes	June 79	Trough washed out
9. Rudy's (T. 36S. R. 15E. S.17 SENW)	No	June 79	
10. Pocket (T. 36S. R. 15E. S.17 SWNE)	Yes	May 80	Good flow, old sheep sign
11. Pocket 1 (T. 36S. R. 15E. S.20 NENE)	Yes	May 80	Major maint. completed
12. Gooseum (T. 36S. R. 15E. S.23 SENW)	Yes	June 79	Major maint. completed
13. Blue Canyon (T. 36S. R. 16E. S.19 SESE)	Yes	February 81	Development washed out

Source Name	Developed	Date of Last Inspection or Maintenance	Comments
14. Call's (T. 36S. R. 15E. S.26 NWSE)	No	September 80	Needs redeveloped
15. Bull's Eye (T. 37S. R. 16E. S.35 SWSE)	Yes	February 81	
16. Radium King or Spook (T. 37S. R. 16E. S.7 SWNE)	Yes	February 81	Good flow, no fresh sheep sign
17. Unnamed Spring (T. 36S. R. 15E. S.35)	No	September 80	
18. West Blue Notch (T. 35S. R. 14E. S.3 NWNE)	NPS	Maybe May 80	
19. Fingers (T. 35S. R. 14E. S.17 SWSE)	NPS	October 79	Trough washed out
20. Kathy's (T. 35S. R. 14E. S.20 NESW)	NPS	October 79	Major maintenance completed
21. Coldwater (T. 35S. R. 14E. S.22 NESW)	NPS	Unknown	
22. Rainbow (T. 35S. R. 14E. S.36 SWSE)	State	May 80	Major maintenance completed
23. Two unnamed springs in 24. right fork of Blue Canyon (T. 36S. R. 15E. S.34 NWSW) (T. 37S. R. 15E. S.3)	BLM	December 80	Needs redevelopment

NOTE: Water sources are shown by number on the Wildlife Habitat:Bighorn/Ferret/Antelope overlay.

Source: McClure, 1981.

TABLE 4350-8

Other White Canyon Seeps and Springs

Source Name	Land Status	Date of Last Inspection or Maintenance	Comments
West Blue Notch	NPS	Maybe May 80	
Fingers	NPS	October 79	Trough Washed Out
Kathy's	NPS	October 79	Major Maintenance Completed
Coldwater	NPS	Unknown	
Rainbow	State	May 80	Major Maintenance Completed
Two unnamed springs in right fork of Blue Canyon (T 36 S., R. 15 E., S.34 NW 1/4 SW 1/4) (T. 37 S., R. 15 E., S.3)	BLM	December 80	Needs Redevelopment

Source: McClure, 1981.

TABLE 4350-9

Water Project Maintenance Schedule

Year One	Year Two	Year Three	Year Four
Coldwater	Gooseum	Pocket	Cottonwood 1
Blue Canyon	Piute	Pocket 1	Dripping
Two unnamed springs in right fork of Blue Canyon	Fingers	Kathy's	Kerr
	West Blue Notch	Upper Rainbow	Rainbow
	Bulls Eye	Radium King	Upper Blue Notch
Tamarisk			

NOTE: Year one was 1980. This schedule is intended to be continuous; therefore, projects designated for maintenance in year one will receive attention again in 1984, 1988, etc.

Source: McClure, 1981.

TABLE 4350-10

Summary of Utah Desert Bighorn Sheep Harvest

Year	Permit Applications	Ram Permits Sold	Hunters Afield	No. of Hunter Days	Ram Harvest	% Succ.
1967	432	10	9	24	9	100
1968	404	10	10	52	3	30
1969	447	10	10	55	6	60
1970	516	10	10	74	4	40
1971	477	10	10	--	1	10
1972	478	10	8	--	1	12
1973	No Hunt					
1974	No Hunt					
1975	147*	5	5	31	2	40
1976	204	10	10	87	4	40
1977	326	25	25	226	10	40
1978**						
Resident	323	20	20	151	6	30
Nonresident	7	3	3	46	1	33
1979**						
Resident	397	17	17	214	2	12
Nonresident	43	1	1	21	1	100
1980**						
Resident	322	17	17	233	8	47
Nonresident	34	1	1	4	1	100
Bid	1	1	1	5	1	100
1981**						
Resident	260	16	16	214	4	25
Nonresident	27	1	1	7	0	0
Bid	2	1	1	5	1	100
1982						
Resident	238	10	10	105	5	50
Bid	1	1	1	4	1	100
1983						
Resident	269	9	9	144	8	89
Bid	1	1	1	6	1	100
Total	5,356	199	196	1,708	80	41

*Beginning in 1975, the permit fee was increased to $100 and had to accompany each application. In 1981, the permit fee was increased to $200.

**Beginning in 1978, nonresident permits were available.

Source: Jense, 1983.

TABLE 4350-11

1983 Utah Desert Bighorn Harvest

Unit	Number of Applications		Applications Per Permit		Number of Permits	
	Res.	Nonres.	Res.	Nonres.	Res.	Nonres.
North San Juan	44	0	22	0	2	0
South San Juan	164	0	33	0	5	0
Potash (Not in SJRA)	61	0	31	0	2	0
Total	269	0	30	0	9	0

	Hunters Afield	Number of Hunter Days	Ram Harvest	% Succ.
North San Juan	2	35	2	100
South San Juan*	5	91	5	100
Potash (Not in SJRA)	2	24	1	50
Total	9	150	8	89

*In addition to the 9 permits authorized by the Board of Big Game Control for the three units, an additional permit was authorized and advertised for bidding. A bid meeting the minimum qualifications was received, and the permittee hunted 6 days and harvested a ram on the South San Juan unit.

Source: Jense, 1983.

TABLE 4350-12

Antelope Herd Management and Harvest Data

HUNTING UNIT BOUNDARY DESCRIPTION

That portion of San Juan County within the following described boundary: Beginning at the junction of Highway U. S. 191 and U-211, thence westerly along U-211 to the boundary of Canyonlands National Park; thence northerly along this boundary to the Colorado River; thence northerly along this river to Hatch Wash; thence southeasterly along this wash to Highway U. S. 191 thence southerly along U. S. 191to its junction with Highway U-211, point of beginning.

RANGE AREA AND APPROXIMATE OWNERSHIP

Ownership	Area (acres)	Percent
Bureau of Land Management	197,760	81
State of Utah	39,680	16
Private	7,040	3
Total	244,480	

INTRODUCTION AND TRANSPLANT

	Number of Animals	Year of Introduction	Planting Site	Trapping Site
Introductions	84	1971	Hatch Point	Lusk, WY
	88	1971	Hatch Point	Lucerne Valley

HARVEST TREND SUMMARY

Year	Hunters Afield	Buck Harvest	Percent Success	Permits Sold
1973	No Hunt			
1974	19	19	100	20
1975	29	28	97	30
1976	10	9	90	10
1977	No Hunt			
1978	10	10	100	10
1979	No Hunt			
1980	No Hunt			
1981	5	5	100	5
1982	No Hunt			
1983	No Hunt			

Source: Jense, et al., 1984.

Only two of these are within the Dry Valley area; those remaining are outside the SJRA Fecal studies conducted between 1977 and 1982 indicate very little competition for forage on these allotments.

Only two sources of drinking water have been developed in the Dry Valley area; available water is extremely limited. On summer range (fawning areas) water developments are needed with a maximum spacing of 2 miles, to allow more effective use of the range with less energy expended in search of water.

None of the antelope habitat within the resource area is protected under current management.

The Hatch Point antelope herd has not been harvested since 1981 (see table 4350-12).

Coincindental sightings by visitors traveling through the area are the only known nonconsumptive use of antelope.

Deer Habitat

There have been no deer transplants or introductions. A HMP was developed for Beef Basin in 1982.

Oil and gas leasing category 2, developed in 1975, protects 216,190 acres of deer winter range between December 1 and March 31.

Table 4350-13 summarizes harvest data for both herd units over the past several years. See table 4350-14 for 1983 hunter pressure by herd unit and the hunter pressure trend over the past 10 years.

Noncomsumptive use involves viewing deer in their natural habitat. Most nonconsumptive use is incidental to other uses such as hiking or sightseeing.

Riparian and Aquatic Habitat

Riparian and aquatic habitats are not now actively managed within SJRA (cross-reference: Grazing Management and Soil, Water, and Air, Part II).

Threatened and Endangered Species Habitat

BLM has not initiated habitat management actions for black-footed ferret or peregrine falcon because it is not known that these species occur within SJRA. Threatened and endangered species are protected by law, and no consumptive use is allowed.

Bald Eagle Habitat

Oil and gas leasing categories along the San Juan River protect 85,325 acres of bald eagle habitat.

TABLE 4350-13

Harvest Trend Summary by Herd Unit

Deer Herd Unit 31a, San Juan-Blue Mountain

		Season			Harvest						Permits	
					Buck		Antlerless					
Year	Type of Hunt	Type	Length	Hunters Afield	No.	%	No.	%	Total	% Suc.	Auth.	Sold
1974	Reg.	4	11	4,887	1,515	66	768	34	2,283	47		
1975	Con.	1b	11	489	116	36	210	64	326	67	500	501
	Reg.	2	11	3,395	917	100	0	0	917	27		
	Total				1,033	83	210	17	1,243			
1976	Reg.	2	11	3,166	1,036	100	0	0	1,036	33		
1977	Reg.	2	11	2,174	584	100	0	0	584	27		
1978	Reg.	2	11	1,913	534	100	0	0	534	28		
1979	Reg.	2	11	2,124	572	100	0	0	572	27		
1980	Reg.	2	7	1,839	538	100	0	0	538	29		
1981	Reg.	2	7	2,000	727	100	0	0	727	36		
1982	Reg.	2	11	2,253	904	100	0	0	904	37		
1983	Reg.	2	11	2,274	1,090	100	0	0	1,090	48		

Deer Herd Unit 31b, San Juan-Elk Ridge

		Season			Harvest						Permits	
					Buck		Antlerless					
Year	Type of Hunt	Type	Length	Hunters Afield	No.	%	No.	%	Total	% Suc.	Auth.	Sold
1972	Con.	1b	11	245	85	56	66	44	151	62	305	305
	Reg.	1	11	2,577	1,145	68	551	32	1,696	66		
	Total				1,230	67	617	33	1,847			
1973	Reg.	1a,1a	11,5	1,920	835	67	405	33	1,240	65		
1974	Reg.	2a,4a	11,11	1,517	553	81	131	19	684	45		
1975	Con.	1ab	11	243	56	35	106	65	162	67	300	253
	Reg.	2	11	1,219	370	100	0	0	370	30		
	Total				426	80	106	20	532			
1976	Reg.	2	11	1,852	654	100	0	0	654	35		
1977	Reg.	2	11	1,072	307	100	0	0	307	29		
1978	Reg.	2	11	947	189	100	0	0	189	20		
1979	Reg.	2	11	891	173	100	0	0	173	20		
1980	Closed to Hunting											
1981	Closed to Hunting											
1982	Closed to Hunting											
1983	Closed to Hunting											

Source: Jense, et al., 1984.

TABLE 4350-14

1983 Hunter Pressure and Trend by Herd Unit

Deer Herd Unit Pressure by Hunter Days (1983 Season)

Management Unit	Participating Hunters Afield	Total Hunter Days	Average Hunter Days
31. San Juan			
(a) Blue Mountain	2,468	9,594	3.9
(b) Elk Ridge*	--	--	--
Total	2,468	9,594	3.9

31a HUNTER PRESSURE TREND

County Residence of Hunter	Percentage of Pressure Applied to Unit									
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Grand								10	7	17
Salt Lake	13	16	9	8	8	7	3	8	5	17
San Juan	21	30	22	51	48	53	60	63	64	33
Other Counties	14	24	12	11	17	10	13	5	9	16
Nonresident	52	33	57	30	27	30	24	14	15	17

31b HUNTER PRESSURE TREND

County Residence of Hunter	Percentage of Pressure Applied to Unit									
	1974	1975	1976	1977	1978	1979	1980	1981*	1982*	1983*
Grand	--	--	--	--	--	--	0	0	0	0
Salt Lake	8	10	4	7	8	7	0	0	0	0
San Juan	16	21	16	13	29	16	0	0	0	0
Other Counties	9	20	9	10	10	12	0	0	0	0
Nonresident	67	49	71	70	53	65	0	0	0	0

*Closed to Hunting.

Source: Jense, et al., 1984.

Nonconsumptive use involves observing the birds in their natural habitat. Use is incidental to other outdoor activities.

Native Fish Species Habitat

The San Juan River in Utah and New Mexico has been regulated by the Navajo Dam near Farmington, New Mexico since 1962 (Twedt and Holder, 1980). This has resulted in significant changes to the river downstream from the dam, particularly the area immediately below the impoundment. Spring flows have been reduced dramatically, and water released from the dam is much clearer and colder than pre-impoundment conditions.

Several new fish species have been introduced, either deliberately for sport fishing or accidentally when bait fish were dumped into the river. The introduced species have evolved in competition with many other species, and therefore are more successful than the native species at competition in the altered river environment.

Nonconsumptive use of these species is limited to scientific interest.

Interim Management Policy

IMP addresses wildlife habitat improvements permissible in WSAs and ISAs and maintenance of existing facilities. No wildlife facilities nor maintenance actions have been proposed in WSAs or ISAs in SJRA.

Planning Guidance

The four MFPs laid out management recommendations to enhance wildlife habitat. These have been accomplished as funds have become available.

Three HMPs have been developed to guide specific management of a primary wildlife species in areas of the SJRA. The plans were developed by SJRA in cooperation with NPS and UDWR.

The Hatch Point Wildlife HMP, approved in 1976, covers 150,400 acres of BLM administered land in the SJRA and the Grand Resource Area This covers the Dry Valley portion of SJRA and is directed at pronghorn antelope habitat management.

The Beef Basin HMP, approved in 1982, covers 175,400 acres of BLM administered land in the SJRA. The HMP also covers parts of CNP and GCNRA. This plan is directed primarily toward management of habitat for deer and desert bighorn sheep.

The White Canyon-Red Canyon HMP, approved in 1982, covers 655,000 acres of BLM administered land in SJRA. The HMP also covers parts of CNP and GCNRA. This plan is directed primarily toward management of desert bighorn sheep habitat.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County. For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

Some local purchases of goods and services can be attributed to wildlife related activities. Activities associated with wildlife are either consumptive or noncomsumptive. Consumptive and nonconsumptive use can be further separated into primary nonresidential, primary residential, secondary nonresidential, and secondary residential activities.

Table 4350-15 presents consumptive wildlife use statistics by species for the San Juan County area. The presence of wildlife can influence a person's decision to visit an area. Use estimates for when wildlife observation is a primary trip purpose, and when wildlife observation is incidental to some other activity, are presented in table 4350-16.

Residential wildlife uses are activities around the home that are related to wildlife. Because these activities take place around the home, few if any local expenditures can be attributed to them.

Average annual wildlife related local expenditures have been estimated based on a 1980 national survey of hunting and various IORT studies (see Table 4350-17) (USDI-USDC, 1980; IORT, 1978; Dalton, 1982). As expected, the hotel-motel sector, outfitters, restaurants, grocery stores, general merchandise stores, gas stations, and auto repair business all depend on wildlife related activities to some extent.

The total local income and employment due to wildlife related recreation within the county, including direct, indirect, and induced effects, are given in Table 4350-18. Altogether, 9.7 of the jobs (0.2 percent of county employment), and $133,271 of the personal income earned in San Juan County (0.2 percent of county income) can be attributed to wildlife related recreation in San Juan County. These figures represent 3 percent of the local income and jobs that are generated by all recreation related expenditures in the county. The local importance of wildlife related recreation was 50 to 100 percent greater in the 1970s when the San Juan-Elk Ridge deer herd unit was open to hunting.

Public lands within the SJRA account for only a portion of wildlife habitat for most species. Therefore, only a portion of the related wildlife recreation expenditure can be attributed to wildlife use of public lands. Based on the proportion of each species habitat which lies on public lands, 4.3 of the jobs, and $59,294 of the income earned in the county (0.1 percent of county employment and income) can be attributed to wildlife use of public lands.

TABLE 4350-15

Average Consumptive Wildlife Use
(1980 to 1984)

Average Number Wildlife Species	Average Number of Hunters[b]	Average Number of Hunter Days
Deer[a]		
31A	2,276	8,877
31B		
Antelope		
Hatch Point	1	2
Desert Bighorn Sheep[b]		
N San Juan	8	70
S San Juan	6	52
Bear	6	31
Cougar	4	26
Pheasant	82	280
Mourning Dove	439	1,537
Chuckar	47	147
Sage Grouse	20	40
Other Grouse	61	160
Cottontail	935	3,931
Snowshoe	4	13
Total		15,166
In Community		10,049
Out of Community		5,117

[a] Although parts of both deer herd units 31A, and bighorn sheep units 3 lie in San Juan County, wildlife related expenditures associated with these units mostly take place in Grand County.

[b] Numbers of hunters are not additive as many hunters hunt more than one wildlife species.

Sources: UDWR, 1983; UDWR, 1982a; UDWR, 1982b.

TABLE 4350-16

Estimated Total Wildlife Use (Hunter Days)

	Out of Community	In Community	Total
Consumptive	5,117	10,049	15,166
Noncomsumptive			
Primary			
Nonresidential			8,000
Residential			12,000
Secondary			
Nonresidential			33,000
Residential			31,000

Source: UDWR, 1983; UDWR, 1982a; UDWR, 82b; USDI-USDC 1980.

TABLE 4350-17

Wildlife Related Distribution of Recreation Expenditures By Standard Industrial Code Sector (1980 first quarter dollars)

SIC Number	Sector Name	San Juan County Recreation & Expenditures	% of Total Sector Sales	Expenditures due to Habitat in the SJRA
45	Public Transportation	$ 2,317	0.2	
54	Food Stores	87,817	1.4	
55	Auto Dealers & Gas Stations	112,312	3.5	
58	Eating & Drinking Est.	49,703	3.2	
70	Hotels & Motels	15,283	1.2	
7999	Amusement & Recreation Services	6,542	N/A	
	Other Retail & Services	9,629		
Totals		$283,603	0.6	$126,179

NOTE: Based on expenditures from consumptive and primary nonresidential wildlife recreation use.

Sources: USDI-USDC, 1980.

TABLE 4350-18

Total Local Income and Employment Generated by Wildlife Related Recreation in San Juan County and the SJRA (1982 first quarter dollars)

	Direct Indirect & Induced Effect					
	San Juan County			SJRA		
Industrial Sector	Earnings[b] (dollars)	Employment (jobs)	% of Total	Earnings (dollars)	Employment (jobs)	% of Total
Farm			0.1			
Private						
Mining						
Construction						
Manufacturing	5,686	0.4	0.3			
Transportation & Utilities	5,138	0.3	0.2			
Wholesale	12,419	0.6	0.5-0.6			
Retail	31,408	3.2	1.0			
F.I.R.E.[a]	1,823	0.1	0.3-0.4			
Services	50,600	4.0	1.0			
Government[c]	2,662	0.2				
Proprietor's[b]		0.9	0.2			
Totals	$111,059	9.7	0.2	$49,412	4.3	0.1

Total Personal Income[b] 133,221

[a] Finance, insurance & real estate.

[b] Earnings include wage, salary, and proprietor's income; personal income also includes dividends, interest, and rents, plus transfer payments and residential adjustments. Proprietor employment is not broken out by sector.

[c] Government sector figures only account for government enterprises such as the Post Office, and do not account for public administration.

Sources: USDI-USDC, 1980; USFS, 1982; BEA, 1984a; BEA, 1984b.

Some of the cost related to managing wildlife within the SJRA also contributes to local sales, and therefore to local income and employment. The resulting income and employment effects are summarized in table 4350-19. These effects, (less than 0.1 percent of local employment and income) are locally insignificant.

In addition to the income and employment effects, wildlife related recreation within San Juan County affects both revenues and costs of several local taxing jurisdictions. Wildlife related sales, gasoline and transient room taxes brought an estimated $6,000 to local taxing jurisdictions (see table 4350-20). Wildlife related recreation attributable to the SJRA brings an estimated $3,000 to local taxing jurisdictions. These figures are thought to be conservative, since they do not include several other related sources. Wildlife related jurisdictional costs could not be delineated and quantified.

CONSISTENCY WITH NON-BUREAU PLANS

UDWR is preparing deer herd management plans for units 31A and 31B. These are interagency plans, with UDWR taking the lead. Neither plan has been completed or approved as of January 1985; however, BLM has contributed to the draft preparation. The draft plans do not present conflicts with wildlife habitat management in SJRA.

UDWR has also stated its intention to prepare an elk herd management plan. As a result of this plan, elk herd unit boundaries may be delineated. No antelope herd managment plan has been initiated.

Plans prepared by other agencies for lands within SJRA boundaries do not address wildlife habitat management.

DATA GAPS

None identified.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

There is a demand by wildlife for food, water, cover, space, and special habitat features such as cliffs, large cottonwood trees, snags, and caves. As a wildlife population increases or expands its range, its demand for the various habitat components also increases. When its demands increase beyond the limits of any single habitat component, the population has exceeded the carrying capacity of the habitat, and the habitat component becomes the limiting factor of population size. Human activities often remove or alter habitat components. Generally this results in some degree of habitat degradation or population loss.

UDWR has established big game population management goals to equal prior stable numbers for the resource area. If UDWR's prior stable numbers or

TABLE 4350-19

Local Importance of SJRA's Wildlife Program Related Costs (1984 fiscal year, 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Program (dollars)	Local Effect	
		Income (dollars)	Employment (jobs)
Public Administration	25,000	10,675	0.6
Other Sectors[a]		5,340	0.3
Total		16,015	0.9

NOTE: Includes the direct indirect and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

Source: BLM Records, USFS, 1982.

TABLE 4350-20

Wildlife Related Taxing District Revenues
(Calendar Year 1984 and Fiscal Year 1985)

	San Juan County	Cities of Monticello and Blanding	Tax Levying[a] Districts	Totals	Revenues due to Wildlife Activities in	
					San Juan County	SJRA
Taxes	$3,543,909	$ 582,906	$ 7,530,196	$11,657,011	$6,000	$3,000
Licenses and Permits	2,853	10,714		13,567		
Intergovernment	2,595,259	924,897	6,847,000	10,367,156		
Charges for services	227,039	82,810	148,000	457,849		
Fines and forfeitures	131,661	56,626		188,287		
Miscellaneous	970,241	285,855	447,820	1,703,916		
Totals	$7,470,962	$1,943,808	$14,973,016	$24,387,786	$6,000	$3,000

NOTE: Only taxes directly associated with the activity were assessed. Indirect and induced fiscal effects were not assessed. Although effects to other revenue sources are expected to be minor, these effects were not quantified. Activity related costs could be neither delineated nor quantified.

[a] Includes: San Juan Water Conservancy District, Monticello Cemetery District, Blanding Cemetery District, and the San Juan County School District. Proprietary fund types are not included.

Sources: Yoakum, 1985; Smuin, Rich, and Marsing, 1984; Monticello, 1984; Utah Tax Commission, 1985; and Utah Foundation, 1985.

population management goals are to be met, the demand for the various habitat components will increase. There are several reasons why current populations are below prior stable numbers.

Major Terrestrial Species Habitats

Desert Bighorn Sheep Habitat

Consumptive demand for bighorn sheep is currently extremely high, as witnessed by the high bid prices paid for hunting permits over the past few years (see table 4350-10). While the number of hunting permits is held to about 10 permits per year statewide, the demand for the permits is high, and almost all of the huntable bighorn population is within the SJRA. The only other area open to hunt is the southern edge of Grand Resource Area bordering San Juan.

For bighorn sheep, more habitat exists within the resource area than is now used by the population (see the Wildlife Habitat: Bighorn/Antelope/Ferret overlay). While a sparse population is scattered throughout this area, current bighorn population numbers are 22 percent below UDWR management goals, or prior stable numbers, for the resource area. Therefore, the habitat is more than sufficient to meet bighorn population demands.

Antelope Habitat

The SJRA has been closed to antelope hunting for the past 3 years (since 1982). In 1981, five permits were issued. The current demand for antelope hunting is high; in 1982 there were over 5,000 applicants for the 446 permits sold statewide (Jense, 1983).

Antelope habitat is limited to the Dry Valley area on the northern border of the resource area (see the Wildlife Habitat: Bighorn/Antelope/Ferret overlay). The antelope population is part of the Hatch Point antelope herd, which also uses habitat in the Grand Resource Area. The current population in the herd unit is 33 percent below UDWR management goals. Therefore, habitat available to the herd is more than sufficient to meet antelope population demands; competition between livestock and antelope for forage is not apparent. Predation and lack of available water do limit population size.

Deer Habitat

Consumptive demand for deer is high. Deer hunting is a popular sport in the SJRA (cross-reference: Recreation Management/Visual Resource Management, Part II). Over the past 4 years (since 1981), over 2,000 hunters have hunted under regular license within deer herd unit 31a (see Wildlife Habitat: Deer/Aquatic/Riparian overlay) while deer herd unit 31b was essentially closed to hunting. Deer use a major part of the resource area as habitat. Winter range and crucial winter range are shown on the overlay. Deer populations are 31 percent below UDWR management goals or prior stable numbers for the resource area. Therefore, habitat present is more than sufficient to meet deer population demands; however, competition with livestock limits use of winter browse and early spring grasses and forbs. Human activities sometimes disturb deer during winter causing death from stress.

Riparian and Aquatic Habitat

Riparian and aquatic habitats, which are localized, are also attractive to livestock and human recreational and agricultural use. Riparian areas often coincide with access routes through the rugged terrain found in most of the resource area. Because riparian and aquatic habitats occur only under specialized conditions, the demand is concentrated, and the capability of the habitat to renew itself is limited. Under constant use pressure, as is now occuring in certain areas (see table 4350-5), the quality of the riparian or aquatic habitat degrades significantly.

There is essentially no consumptive demand for fish species within the SJRA, as there are no recognized fisheries within the area. Some catfish harvest may take place from the San Juan River. An unmeasured, limited amount of trapping occurs along riparian areas.

Threatened and Endangered Species Habitats

Bald eagle habitat is generally limited to riparian areas. The capability of the resource area to meet this demand is as discussed above for riparian and aquatic habitat.

Black-footed ferret habit is limited to prairie dog towns. Sufficient habitat exists within the resource area to support black-footed ferrets, although at this time (late 1984) none have been found.

Peregrine falcon habitat is scattered throughout portions of the resource area, but nesting areas have not been confirmed.

Endangered and sensitive fish species habitat is limited to the San Juan River. This habitat is being altered by water projects outside the resource area. Because specialized habitat requirements for these species are unknown, the capability of the river to meet habitat demands is also unknown.

There is no consumptive demand for these species, as it is illegal to harvest threatened, endangered or sensitive species under the Endangered Species Act of 1973 and State law.

In FY 1983, 10 work months were spent conducting wildlife work or on-the-ground project development in the SJRA.

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

The future demands for wildlife habitat are expected to increase. The capability of the resource area to meet the increasing demands of wildlife is questionable. As the future demands for other land uses increase, more pressure will be brought against wildlife habitat. In maintaining a balance of uses, it may be possible to manage wildlife habitat at a level that will produce sustained yields of wildlife populations. However, UDWR's prior stable numbers and population management goals may never be attained.

Major Terrestrial Species Habitats

Public demand for big game increases every year. As the human population within our nation continues to increase, it will become more difficult on a nationwide basis to meet the future demands for consumptive uses of wildlife (refer to Recreation Management/Visual Resource Management, Part II for specific demand projections). Certain areas within the SJRA have potential for wildlife habitat improvement through land treatment, livestock grazing manipulation, protective stipulations, or the development and implementation of AMPs and HMPs. Through the application of these management practices, some of the increased demands can be met.

Bighorn Sheep Habitat

Consumptive demand for bighorn sheep is expected to increase. The extent of demand for these animals is indicated by the price of $32,000 paid, under bid, for a hunting permit in 1983. A high level of demand is expected to continue so long as limited numbers of animals are harvested and the value of obtaining a rare trophy continues.

The demand on the habitat by the bighorn population is expected to increase as the sheep population increases, but the extent of habitat is expected to remain sufficient. Populations of sheep tend to be self-limiting (i.e., controlled through such factors as disease and lamb mortality). Future competition with livestock for forage could occur if livestock range is increased in bighorn areas. If competition is to occur between livestock and bighorn, it will be in an area with limited food, water, cover, or space, which is occupied by both species, and it will be during the winter-spring season when livestock and bighorn are most apt to occupy the same areas. If allowed to encroach on bighorn habitat, human activities (e.g., oil and gas exploration), could displace bighorn from lambing areas or interrupt the rutting season.

Antelope Habitat

Consumptive demand for antelope statewide is expected to remain high, based on the number of applications received for the permits issued. It is expected that a proportionate demand would exist for antelope permits within the SJRA, if such permits were issued.

The demand on the habitat by the antelope population is expected to increase as the antelope population increases, but the extent of habitat available to the herd is expected to remain sufficient. Predation and lack of water are expected to continue to influence the rate of increase of herd size. Increasing competition between antelope and livestock for winter browse and early spring grasses and forbs is expected as both antelope and livestock populations (using the same areas) increase. Human activities (e.g., oil and gas exploration), if allowed to encroach on antelope habitat, could displace antelope from their preferred fawning areas during the fawning season.

Deer Habitat

Consumptive demand for deer is expected to remain constant, as evidenced by the number of hunters using the area (see table 4350-13). Over the past 8 years, since 1977, use appears to have stabilized. Accordingly, future consumptive demand would be expected to remain at between 2,000 and 3,000 hunters per season.

The demand on the habitat by the deer population is expected to increase as the deer population increases, but the number of deer is not expected to exceed the available habitat within the next 10 years (before 1995). Increasing competition between deer and livestock for winter browse and early spring grasses and forbs is expected as both deer and livestock populations (using the same areas) incease. Human activities (e.g., oil and gas exploration), if allowed to continue to encroach on deer habitat, would continue to stress the herd during the winter.

Riparian and Aquatic Habitat

The use pressure now occurring on riparian and aquatic habitats (see table 8) is expected to continue, causing this type of habitat to continue to degrade in quantity and quality. If competing uses now causing this degradation increase, the degradation will occur at a faster rate.

No increase in demand for consumptive use is expected to occur.

Threatened and Endangered Species Habitat

Bald eagle habitat is generally limited to riparian areas. The capability of the resource area to meet this demand is as discussed above for riparian and aquatic habitats.

Black-footed ferret habitat is limited to prairie dog towns. Encroachment of human activities on these areas, or prarie dog control (shooting or poisoning) to an extent that would limit the prairie dog as a food supply, could decrease the habitat required by the black-footed ferret. These activities could also injure or kill the black-footed ferrets, if present.

Peregrine falcon habitat is expected to continue to be sufficient. Alteration of endangered and sensitive fish habitat is expected to continue at the current rate. Because specialized habitat requirements for these species are unknown, the capability of the river to meet future habitat demands is also unknown.

There is expected to be no future consumptive demand for these species, as it is illegal to harvest threatened, endangered, or sensitive species under the Endangered Species Act of 1973 and State laws.

CRITICAL THRESHOLDS

A critical threshold has not been determined for wildlife species in the SJRA. Although it is posssible that one type of activity could cause a significant adverse impact to wildlife habitat, it is more likely that the cumulative effect of combined change agents would, over time, cause a deterioration of habitat. Change agents could be natural (e.g., disease or drought), but are more likely to be livestock grazing or human activities. The cumulative impact on any wildlife species would be displacement of part of that population to less desirable areas, or death of part of the population. The result is either a loss of habitat quality or a loss of that area's ability to support the same numbers of wildlife.

The critical threshold at which the habitat deterioration becomes significant has not been quantified for the wildlife populations within the resource area due to lack of data.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

The adequacy of current management can be inferred from the extent of habitat loss. If habitat increases or remains stable, management is generally adequate. If habitat loss occurs, management for wildlife species can be assumed to be inadequate.

Major Terrestrial Species Habitat

Desert Bighorn Sheep Habitat

Not all water developments have remained viable. A maintenance schedule has been developed to correct this (see table 4350-9).

No loss of bighorn sheep habitat within SJRA can be documented (King and Workman, 1983).

Pronghorn Antelope Habitat

A lack of water development prevents any increase in suitable habitat. No habitat loss has been identified.

Deer Habitat

Deer habitat management appears adequate. No loss of deer habitat has been reported; pinyon-juniper habitat may be increasing.

Riparian and Aquatic Habitats

Riparian areas have historically been grazed by livestock. The effect of past livestock consumption is apparent in that only mature cottonwood stands are now present. Young trees are not reaching maturity to replace present stands. Losses have also occurred because of wood cutting. The extent of habitat losses has not been quantified.

Threatened and Endangered Species Habitat

Bald eagle habitat within SJRA coincides with riparian habitat; management appears inadequate (see above). Adequacy of management for black-footed ferret and peregrine falcon cannot be determined, as the species are not known to be present.

As measures have been taken to improve water quality through impoundments and other sediment reduction efforts, river water conditions have been altered. The lower flows, clearer water, and colder temperatures appear to benefit introduced species over the native endangered and sensitive species. The generalized loss of river habitat conditions favored by the endangered and sensitive fish is known to have occurred, but has not been quantified. Losses of specialized habitat, if occurring, are unknown.

MANAGEMENT OPPORTUNITIES

A variety of laws, EOs, BLM manuals, IMs, and policies are available under current management to resolve many of the conflicts and problems identified. Stipulations on land use activities could be employed administratively to protect wildlife habitat.

Through the RMP process, the season of livestock use on some allotments could be changed; grazing could be eliminated from riparian areas; and measures could be taken to ensure that livestock will not be moved onto mesa tops and higher talus slopes. Grazing management could be altered to allow for greater consideration of wildlife habitat needs. Excluding livestock from certain areas, adjusting livestock numbers by allotment, developing range projects that would also benefit wildlife, and developing land treatments are all opportunities available. Grazing systems, AMPs, or HMPs (covering land treatments and revegetation projects) that would enhance wildlife habitat could be developed later, at the activity plan level.

Oil and gas leasing categories now in effect have identified many areas in SJRA significant to wildlife and have protected them by appropriate stipulations. The current leasing category application is outdated in places. Some areas of wildlife habitat were not included, and wildlife populations have left some areas where protective stipulations were employed.

The RMP process provides an opportunity to revise the application of oil and gas leasing categories to mitigate existing and potential wildlife conflicts; to protect bighorn rutting and lambing areas, antelope fawning grounds, and deer winter areas; and to prevent degradation of riparian and aquatic habitats and loss of habitat for nesting raptors.

Protective stipulations can be included in other land use decisions and management actions where those decisions or actions could affect wildlife habitat. For example, placement of access roads has seriously impacted many of the riparian areas. These are the roads in drainage bottoms used by miners, livestock operators, hunters, and others, primarily to gain access to other areas. Stipulations for many types of actions can be developed administratively on a case-by-case basis.

The opportunity exists for stipulations to be developed through the RMP and applied evenly to significant wildlife habitat areas, for different types of proposed land use actions (including tar sand development). The extent to which these can be applied to actions under the 1872 Mining Law remains limited.

ORV use restrictions that can be designated through the RMP provide another opportunity to prevent deterioration of riparian habitat quality.

The following discussion identifies the grazing allotments and management opportunities and limitations or unresolvable conflicts for the major wildlife habitats found in the SJRA. Conflicts and management opportunities by allotment are shown in table 4350-21.

Major Terrestrial Species Habitats

Bighorn Sheep Habitat

Allotments. Hart Draw, Hurrah Pass (south), Indian Creek, Lower Indian Creek, Beef Basin, Dark Canyon Plateau, Lake Canyon, Slickhorn, White Canyon, Perkins Brothers, and Texas Muley.

Management Opportunities. Develop a grazing system that will keep livestock from occupying the mesa tops and higher talus slopes. Develop oil and gas leasing category stipulations that will minimize disturbance to areas used by rams and ewes during the breeding season (October 15 through December 31) and the lambing season (April 1 through July 15).

Inspections of water developments used by bighorn sheep reveal the need for periodic maintenance. Many of the seeps are on steep slopes where they can be washed out or covered by rock slides, and some may dry up during the summer. Most of the troughs need an overflow pipe. Regular inspection and maintenance of developed water sources are needed to ensure that adequate water is available for bighorn sheep.

Antelope Habitat

Allotments. Lone Cedar, Tank Draw, Hart Draw, Mail Station, Dry Valley-Deer Neck, and Church Rock.

Management Opportunities. Develop an oil and gas leasing category stipulation to protect antelope fawning areas from May 15 through June 30. Establish additional waters to reduce fawn losses during the summer months; place water developments in more open, rolling terrain, where antelope can avoid predators. Additional water sources would improve the Dry Valley area for antelope fawning and help ensure faster growth of the fawns, which would make them less vulnerable to predation.

Deer Habitat

Allotments. Indian Creek, Tank Bench-Brushy Basin, White Mesa, Lake Canyon, Hart Point, Hart Draw, Lone Cedar, Verdure Creek, Montezuma Canyon, Pearson

Canyon, Pearson Point, Horsehead Canyon, Monument Canyon, Cave Canyon, Little Boulder, Alkali Canyon, Alkali Point, Cross Canyon, and Bug Squaw.

Management Opportunities. Change season of livestock use on several allotments. Develop grazing systems to make more winter and spring forage available to deer on several allotments. Develop oil and gas leasing category stipulations that will protect deer winter ranges from December 15 through April 30.

Riparian and Aquatic Habitats

Allotments

Montezuma Canyon, Monument Canyon, Indian Creek, Slickhorn, Lake Canyon, Tank Bench-Brushy Basin, White Mesa, East League, Cave Canyon, Cross Canyon, Hart Draw, Indian Creek, Comb Wash, Texas Muley, Perkins Brothers, and Bulldog.

Management Opportunities

Develop grazing systems to protect the riparian zone for a complete year. Fence the riparian zone to protect it from livestock grazing and vehicle travel. Align roads to avoid the riparian zone.

Threatened and Endangered Species Habitats

Bald Eagle Habitat

Allotments. Tank Bench-Brushy Basin, Perkins Brothers, Montezuma Canyon, Cave Canyon, McCracken, and East League.

Management Opportunities. Develop a grazing system to protect cottonwood tree saplings, or fence cottonwood tree stands.

Black-Footed Ferret Habitat

Allotments. Mail Station, Big Indian, Tank Draw, Dry Valley, Dry Farm, East Canyon, Cross Canyon, Black Steer, White Mesa, and McCracken.

Management Opportunities. Develop oil and gas leasing category stipulations to protect prairie dog colonies from surface disturbance. Prevent poisoning of prairie dogs; however, poisoning or shooting of prairie dogs is difficult to detect and prevent.

Peregrine Falcon Habitat

Allotments. Slickhorn, Lake Canyon, and Indian Creek.

Management Opportunities. Continue investigation to determine whether nesting peregrine falcons are present. However, available water and major food sources may be insufficient to support significant populations of peregrine falcons.

TABLE 4350-21

Wildlife Habitat Management Conflicts and Opportunities, by Allotment

Allotment No. and Name	Conflicting Activities	Management Opportunities					
		Fence	Remove Grazing	Change Season	Grazing System	Land Treatment	Oil & Gas Stipulations
6801 Alkali Canyon	Grazing (HPI) Minerals (HPI	X			X		X
6802 Alkali Point	Grazing (HPI) Minerals (HPI)	X			X		X
4830 Bear Trap	None						
4826 Big Indian	Grazing (Aq/Rip) Minerals (T/E)						X
6804 Black Steer	Minerals (T/E)						X
6835 Blue Mountain	None						
6803 Bluff Bench	None						

6805 Brown Canyon	None					
6846 Bug-Squaw	Grazing (HPI) Minerals (HPI)	X	X	X	X	X
6806 Bulldog	None					
6808 Cave Canyon	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E, HPI)	X	X	X		X
4827 Church Rock	Grazing (HPI) Minerals (HPI)		X	X	X	X
6836 Comb Wash	Grazing (Aq/Rip, HPI) Minerals (Aq/Rip, HPI)		X	X	X	X
6838 Corral	None					
6811 Cross Canyon	Grazing (Aq/Rip, T/E) Minerals (Aq/Rip, T/E, HPI)	X	X	X		X
6812 Devils Canyon	None					

		Management Opportunities					
Allotment No and Name	Conflicting Activities	Fence	Remove Grazing	Change Season	Grazing System	Land Treatment	Oil & Gas Stipulations
6813 Dodge Canyon	None						
6814 Dodge Point	None						
4804 Dry Farm	Minerals (T/E)						X
4820 DryValley-Deer Neck	Grazing (T/E) Minerals (T/E)			X	X		X
4814 East Canyon	Grazing (T/E) Minerals (T/E)						X
6815 East League	Grazing (Aq/Rip, T/E) Minerals (Aq/Rip, T/E)		X	X	X		X
4810 East Summit	None						
4811 Hart Draw	Grazing (Aq/Rip, HPI) Minerals (Aq/Rip, HPI) Recreation (HPI)	X		X	X		X

4825 Hart Point	Grazing (HPI) Minerals (T/E)		X	X		X
6816 Horsehead Canyon	Grazing (HPI) Minerals (HPI)		X			X
4813 Hurrah Pass	Grazing (HPI) Minerals (HPI)	X		X		X
4815 Indian Creek	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E, HPI) Recreation (Aq/Rip)	X	X	X		X
4822 Indian Rock	None					
6818 Johnson Creek	None					
6839 Laws	None					
6833 Lake Canyon	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E, HPI) Recreation (Aq/Rip, HPI)		X	X	X	X

Allotment No. and Name	Conflicting Activities	Management Opportunities					
		Fence	Remove Grazing	Change Season	Grazing System	Land Treatment	Oil & Gas Stipulations
6819 Little Boulder	None						
4801 Lone Cedar	Grazing (HPI) Minerals (HPI)	X		X	X		
6820 Long Canyon	None						
6821 Lyman	None						
4819 Mail Station	Grazing (T/E, HPI) Minerals (T/E, HPI)			X	X	X	X
6822 McCracken	Grazing (T/E) Minerals (T/E)						X
6823 Montezuma Canyon	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E, HPI) Recreation (Aq/Rip, T/E)		X	X	X		X
4806 Monticello Cowboy	None						

6825 Monument	Grazing (Aq/Rip, HPI) Minerals (Aq/Rip, HPI)	X	X	X	X	X
6824 Owens Dugout	None					
6845 Pearson Point	None					
6827 Perkins Brothers	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E, HPI) Recreation (Aq/Rip T/E, HPI)	X	X	X		X
4807 Peters Canyon	None					
4805 Peters Point	None					
6841 Piute Knoll	None					
6842 Rogers	None					
6847 Roundup Corral	None					

Allotment No. and Name	Conflicting Activities	Management Opportunities					
		Fence	Remove Grazing	Change Season	Grazing System	Land Treatment	Oil & Gas Stipulations
6724 Sage Flat	None						
6716 Sage Grouse	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E, HPI) Recreation (Aq/Rip, HPI)			X	X	X	X
4824 South Canyon	None						
4823 Spring Creek	None						
4812 Spring Creek West	None						
6828 Squaw Canyon	None						
4831 State Line	None						
6830 Stevens	None						
4818 Summit Canyon	None						

6831 Tank Bench-Brushy Basin	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E, HPI) Recreation (Aq/Rip, T/E, HPI)	X	X	X	X	X
4802 Tank Draw	Grazing (Aq/Rip, HPI) Minerals (T/E)	X	X	X		X
6844 Texas-Muley	Grazing (Aq/Rip, HPI) Minerals (Aq/Rip, HPI)		X	X	X	X
4817 Upper East Canyon	None					
4803 Vega Creek	None					
6832 Verdure Creek	Grazing (HPI) Minerals (HPI)			X		X
6837 White Canyon	Grazing (HPI) Minerals (HPI)			X		X
6840 White Mesa	Grazing (Aq/Rip, T/E, HPI) Minerals (Aq/Rip, T/E)		X	X	X	X

NOTE: Aq/Rip = aquatic/riparian habitat; T/E = threatened and endangered species habitat; HPI = habitat for species of high public interest.

Threatened and Endangered Fish Species Habitat

No opportunities identified.

ACEC POTENTIAL

Four areas (see figure 4350-6) have potential to qualify for ACEC designation to protect wildlife habitat values. They are: the Hatch Point-Dry Valley antelope habitat, crucial desert bighorn sheep habitat, most aquatic and riparian habitat in the resource area, and crucial deer winter range.

Hatch Point-Dry Valley Antelope Habitat

This area is shown on the Wildlife Habitat: Bighorn/Antelope/Ferret overlay and includes about 34,000 acres of public lands; about 13,000 acres of this has been identified as crucial habitat.

These antelope lambing areas need to be protected from conflicting land uses that could eliminate or degrade their significant habitat values.

Antelope require specific areas with forage and water and with terrain that enables them to detect and avoid approaching predators. This area is important because it is the only antelope habitat in the resource area.

Mineral (oil and gas) development and exploration can prevent antelope from occupying their preferred lambing areas during the lambing season. If antelope are forced into less desirable areas, the lamb production will decrease due to predation, lack of water, or lack of forage.

Livestock grazing within the lambing areas removes forage (grass and forbs) that is needed by lactating does to maximize fawn growth so that they can avoid capture by predators.

The habitat area encompasses about 37,300 acres. Most (about 30,000 acres) of this area is BLM administered public lands. A portion of the area has both oil and gas leases and mining claims.

Adjacent lands are used for livestock grazing, mineral and oil and gas exploration and development, and recreation (sightseeing and hunting). Mineral and oil and gas activities and livestock grazing threaten the special wildlife values. No alternative boundaries have been determined.

Possible management prescriptions to manage the potential ACEC are as follows.

Change season of livestock use to remove cattle by March 31. Develop an oil and gas leasing category stipulation to protect antelope fawning areas from May 15 through June 30. Establish additional waters to reduce fawn losses.

No other special designation is felt to be applicable.

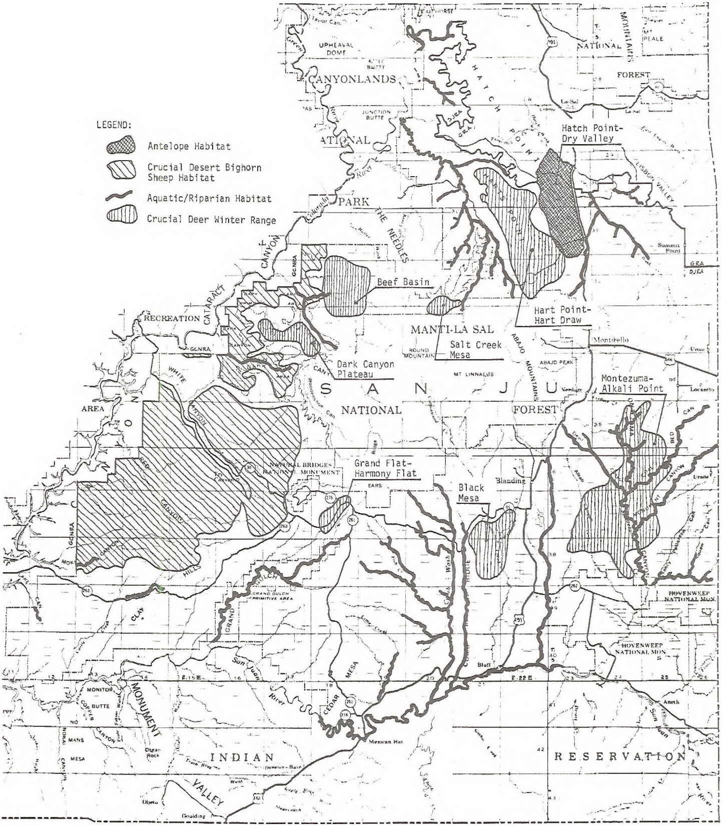

LEGEND:
Antelope Habitat
Crucial Desert Bighorn Sheep Habitat
Aquatic/Riparian Habitat
Crucial Deer Winter Range
Hatch Point-Dry Valley
Hart Point-Hart Draw
Beef Basin
Salt Creek Mesa
Dark Canyon Plateau
Montezuma-Alkali Point
Grand Flat-Harmony Flat
Black Mesa
CANYONLANDS
NATIONAL
PARK
UPHEAVAL DOME
JUNCTION BUTTE
THE NEEDLES
CATARACT
CANYON
RECREATION
AREA
GCNRA
MANTI-LA SAL
NATIONAL
FOREST
S A N J U
ROUND MOUNTAIN
MT LINNAEUS
ABAJO PEAK
ABAJO MOUNTAINS
HATCH POINT
LISBON VALLEY
Summit Point
Monticello
La Sal
MOUNTAINS
MT PEALE
Blanding
NATURAL BRIDGES NATIONAL MONUMENT
WHITE CANYON
RED CANYON
GRAND GULCH
GRAND GULCH PRIMITIVE AREA
CEDAR MESA
Mexican Hat
Bluff
HOVENWEEP NATIONAL MON.
Aneth
MONUMENT
INDIAN
RESERVATION
VALLEY
MONITOR BUTTE
Oljeto
Goulding
San Juan River
R.15E.
R.22E.

FIGURE 4350-6

Potential ACECs, Wildlife Habitat

There has been no documented expression of interest in protecting these special values through ACEC designation.

Crucial Desert Bighorn Habitat

This area is shown on the Wildlife Habitat: Bighorn/Antelope/Ferret overlay and includes about 330,000 acres. It is split into two areas. The northern portion, which includes part of the Dark Canyon PA, contains about 63,000 acres, and the southern portion about 267,000 acres.

These areas have specific natural value as lambing and rutting areas for bighorn sheep. The values need protection from conflicting land uses that could eliminate or degrade their crucial habitat values.

Desert bighorn sheep require specific areas with steep, rugged terrain for escape cover and with adequate forage and water. This area is important because it provides habitat for the largest population of desert bighorn sheep in Utah. Bighorn sheep are a nationally important species of wildlife.

Mineral (oil, gas, and uranium) exploration and development can prevent bighorn sheep from occupying their preferred lambing and rutting areas during the lambing and rutting seasons. If bighorn are forced into less suitable areas, the lamb production will decrease due to predation, lack of water, or lack of forage.

Livestock grazing and associated range improvements can cause bighorn habitat to be eliminated or degraded. This would occur if livestock were to make more use of the mesa tops and the talus slopes. If this happened, competition for forage, water, and space would result in lamb loss due to lowered lactation, abandonment, and predation. Range improvements such as chainings and water developments could result in herd displacement and in higher lamb mortality.

The habitat area on public lands encompasses about 330,000 acres. In addition are state lands scattered throughout the southern portion of the potential ACEC. A portion of the area has both oil and gas leases and mining claims.

The potential ACEC area is adjacent to CNP on the north and to GCNRA on the west. The northern portion of the ACEC corresponds roughly with the Dark Canyon PA, and overlaps the potential ACEC for this area discussed under recreation (cross reference: Recreation/Visual Resources Management, Part II). Adjacent lands are used for livestock grazing, mineral and oil and gas exploration and development, and recreation (sightseeing and hunting). Mineral and oil and gas activities and livestock grazing threaten the special wildlife values. No alternative boundaries have been determined.

Possible management prescriptions to manage the potential ACEC are as follows.

Develop a grazing system that will keep livestock from occupying the mesa tops and higher talus slopes. Develop oil and gas leasing category stipulations that will minimize disturbance to areas used by rams and ewes during the breeding season (October 15 through December 31) and the lambing season (April 1 through July 15).

An ONA has been discussed as an alternative to ACEC designation to recognize recreation values in the Dark Canyon-Middle Point area (cross reference: Recreation/Visual Resources management). This type of designation empahsizes recreational use, and would not serve to protect the wildlife habitat as would an ACEC designation.

There has been no documented expression of interest in protecting these special wildlife values through ACEC designation.

Aquatic and Riparian Habitats

These areas are shown on the Wildlife Habitat: Deer/Aquatic/Riparian overlay and include about 480 miles of stream length on BLM administered lands (see table 4350-18). Using a corridor width of 0.13 mile, the potential area totals about 38,400 acres.

These areas have special values for use by T/E species such as bald eagle and some native fish species present in the San Juan River, and by many game and nongame species and need to be protected from conflicting land uses that could eliminate or degrade their crucial habitat values.

These are special areas with a variety of vegetation for food and cover and with a permanent or semipermanent source of water. They are inhabited by a variety of game, nongame, and T/E species. These areas are important because they make up less than 1 percent of the total SJRA acreage and yet are used by a variety of wildlife and fish species.

Mineral exploration and development and associated access roads often occur in aquatic and riparian areas. This can result in destruction of vegetation, loss of soil, and degraded water quality. Wildlife species may then be displaced to less desirable areas, resulting in population decline due to nest failure, loss of suitable habitat to rear young, or loss of breeding grounds.

ORV use and access roads can also cause deterioration of habitat quality for the same reasons.

Livestock grazing occurs in riparian areas and causes overutilization of the vegetation and degradation of water quality.

Firewood, fence posts, and corral poles are often cut from riparian areas. This removes trees used by bald eagles and other species of wildlife.

Most (about 76 percent)of these areas are under BLM ownership (see table 4350-18 for stream miles in each area).

Specific details of land status are listed below:

Area	Rights Contained	Adjacent Ownership
San Juan River	oil and gas leases	Navajo Indian reservation; GCNRA

Area	Rights Contained	Adjacent Ownership
Montezuma Canyon drainage	oil and gas leases mining claims	many areas of private and State lands; Navajo Indian reservation
Gypsum Canyon drainage	no leases or claims	in Dark Canyon PA; adjacent to GCNRA
Indian Creek drainage	oil and gas leases mining claims	Newspaper Rock R&PP patent private and state lands; CNP
Lockhart Canyon drainage	oil and gas leases mining claims	CNP
East Canyon drainage	oil and gas leases mining claims	some private and state lands
Colorado River	oil and gas leases mining claims	NPS administers both banks within most of SJRA
Recapture Creek drainage	oil and gas leases mining claims	some state lands; Navajo Indian reservation
Butler Wash drainage	oil and gas leases mining claims	some state lands
Comb Wash drainage	oil and gas leases mining claims	some state and private lands; Manti-LaSal NF
Lime Creek drainage	oil and gas leases mining claims	
Grand Gulch drainage	oil and gas leases	in Grand Gulch PA; adjacent to GCNRA
Clay Hills Canyon	oil and gas leases mining claims	some state lands
Lake Canyon drainage	oil and gas leases mining claims	GCNRA
Moki Canyon drainage	oil and gas leases mining claims	some state lands; GCNRA
Dark Canyon drainage	none	in Dark Canyon PA; adjacent to GCNRA

Some of the drainages fall within areas having ACEC potential for other resource values (cross-reference: Natural History/Cultural Resources Management and Recreation/Visual Resources Management, Part II). The areas correlate as follows: Montezuma Canyon and Recapture Creek drainages-Alkali Ridge potential ACEC (cultural values); Gypsum Canyon and Dark Canyon drainages-Dark Canyon potential ACEC (recreational values); Indian Creek drainage-North Abajo potential ACEC (cultural values); Lockhart Canyon drainage-Lockhart Basin potential ACEC (scenic values); and Grand Gulch drainages-two Grand Gulch potential ACECs (cultural values and recreational values). The wildlife habitat values could enhance ACEC potential listed for the other resource values.

Adjacent lands are used for livestock grazing, mineral and oil and gas exploration and development, and recreation (sightseeing and hunting). Mineral and oil and gas activities and livestock grazing threaten the special wildlife values. Alternative boundaries could be accomplished by including different combinations of the 16 areas identified and by defining different corridor widths. The area defined included a corridor width of 0.13 mile; widths of 0.5 mile (153,600 acres total) or 0.25 mile (76,800 acres total) are also possible.

Possible management prescriptions to manage the potential ACEC are as follows.

Develop grazing systems that will protect the riparian zone for a complete year. Fence the riparian zone to protect it from livestock grazing and vehicle travel. Align roads to avoid the riparian zone. Develop a grazing system that will protect cottonwood saplings, or fence cottonwood tree stands.

No other special designation is believed applicable. Certain of these areas fall within potential ONAs (cross-reference: Recreation/Visual Resource Management, Part II). The areas correlate as follows: Gypsum Canyon and Dark Canyon drainage-Dark Canyon ONA; Butler Wash drainage-Arch Canyon, Mule Canyon, Fish and Owl Creeks, and Road Canyon ONAs; Lime Creek drainage-Lime Creek ONA; and Grand Gulch drainage-Grand Gulch ONA. This type of designation emphasizes recreational use, and would not serve to protect wildlife habitat as would an ACEC designation.

There has been no documented expression of interest in protecting these special wildlife values through ACEC designation.

Crucial Deer Winter Range

This area is shown on the same overlay and includes seven geographic areas totaling approximately 152,500 acres (see table 4350-3).

These areas have high concentrations of deer during the winter months and need to be protected from conflicting land uses that could degrade their crucial habitat values.

Deer require specific areas with vegetation for use as forage (browse and grass) and larger trees for thermal cover. Terrain can vary from flat ground to steep hillsides. These areas are important because they are occupied by large numbers of deer during the winter. Deer are a nationally important species of wildlife.

Livestock compete with wintering deer for forage.

Land Status

The habitat area on public lands encompasses about 152,500 acres. In addition, all areas have state lands scattered throughout, and the Hart Point-Hart Draw and Montezuma-Alkali Point areas contain scattered tracts of private lands. Specific land status details are listed below.

Area	Rights Contained	Adjacent Ownership
Beef Basin	oil and gas leases	Dark Canyon PA; near Manti-LaSal NF and CNP
Salt Creek Mesa	oil and gas leases	CNP; Manti-LaSal NF
Dark Canyon Plateau	oil and gas leases	Dark Canyon PA; Manti-LaSal NF
Black Mesa	oil and gas leases mining claims	
Grand Flat-Harmony Flat	oil and gas leases	near Natural Bridges NM
Hart Point-Hart Draw	oil and gas leases mining claims	Manti-LaSal NF; some private lands
Montezuma-Alkali Point	oil and gas leases mining claims	Navajo Indian reservation; some private lands

Some of these areas coincide in part with areas having ACEC potential for other resource values (cross-reference: Grazing Management, Natural History/Cultural Resources Management, and Recreation/Visual Resource Management, Part II). The areas correlate as follows: Salt Creek Mesa-North Abajo potential ACEC (cultural values) and adjacent to Bridger Jack Mesa potential ACEC (rangeland study and recreational values); Dark Canyon Plateau-Dark Canyon potential ACEC (recreational values); Hart Point-Hart Draw-North Abajo potential ACEC (cultural values); and Montezuma-Alkali Point-Alkali Ridge potential ACEC (cultural values). The wildlife habitat values could enhance ACEC potential listed for the other resource values.

One area overlaps aquatic and riparian habitats having ACEC potential, described above: Montezuma-Alkali Point-Montezuma Canyon drainage.

Adjacent lands are used for livestock grazing, mineral and oil and gas exploration and development, and recreation (sightseeing and hunting). Mineral and oil and gas activities and livestock grazing threaten the special wildlife values. Alternative boundaries could be accomplished by including different combinations of the seven areas identified.

Possible management prescriptions to manage the ACEC are as follows.

Change season of livestock use on several allotments. Develop grazing systems to make more winter and spring forage available to deer on several allotments. Develop oil and gas leasing category stipulations that will protect deer winter ranges from December 15 through April 30.

No other special designation is felt to be applicable. A portion of the Dark Canyon Plateau potential ACEC overlaps an area identified as a potential ONA: the Dark Canyon potential ONA (cross-reference: Recreation/Visual Resource Management, Part II) the Salt Creek Mesa potential ACEC is adjacent to an area identified as a potential RNA: Bridger Jack Mesa (cross-reference: Grazing Management, Part II). An ONA designation empahsizes recreational use and an RNA designation scientific research; neither would serve to protect wildlife habitat as would an ACEC designation.

There has been no documented expression of interest in preserving these special wildlife values through ACEC designation.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

Management of wildlife habitat is constrained by the requirement to manage public lands for multiple uses. The resource use conflicts that lead to habitat losses and prevent achievement of UDWR wildlife population goals cannot always be completely mitigated.

The dewatering of streams for agricultural purposes constrains aquatic habitats.

Cutting wood products (firewood, fence posts, and corral posts) constrains management of raptor habitat by removing mature trees now being used as roosts and hunting perches. Wood cutting along riparian areas removes cottonwood trees used by bald eagles during the winter. Current management allows only pinyon and juniper trees to be cut, and a permit is required (cross-reference: Forest Management, Part II). The RMP process cannot prevent illegal harvest of wood products.

DOCUMENTED PUBLIC CONTROVERSY

None.

APPENDIX 4350-A

Director's Fish and Wildlife Resources Management Policy Statement

October 20, 1983

To conduct an effective program for the management of fish and wildlife resources, the BLM will:

- recognize state management of resident species and that a state-federal partnership is essential for species habitat management programs. In working with the States the BLM will continue to use its authority under the Sikes Act as one of the primary means for achieving effective coordination.

- forge strong and effective communications and coordination between the wildlife program and other Bureau programs, encouraging interdisciplinary teamwork in the development of resource management options that meet fish and wildlife objectives.

- initiate active cooperation with state, local, and other federal agencies in all facets of the wildlife program. These agencies are encouraged to maximize use of available resources by providing funds, equipment or exchanging information and skills needed for fish and wildlife management.

- create opportunities for broad public involvement that will foster awareness, support, assistance, and participation in cooperative programs that enhance fish and wildlife habitat.

- actively encourage cooperative management agreements with wildlife management agencies and organizations, other conservtion interests, and public service groups.

- focus inventory, monitoring, and research efforts in areas of high wildlife values, concerns, opportunities, and where public interest or controversy exists.

- develop recommendations for wildlife habitat management based on analysis of ecological conditions, legal mandates, federal goals for migratory species and federally listed threatened or endangered species, state goals for resident wildlife populations, social and economic values, and concerns of the public.

- maximize fish and wildlife resource opportunities through program initiatives, such as HMPs, and constructive interaction with other resource uses and activities.

- conduct investment analyses to assure that all habitat improvement plans constitute the most cost-effective means of achieving stated management objectives for fish and wildlife habitat.

- develop incentives to encourage benefitting users, including local governments, interest groups, and individuals, to invest in fish and wildlife habitat management and enhancement.

- strengthen and improve the professional, technical, interdisciplinary, and managerial skills of Bureau fish and wildlife personnel to enhance their performance and increase job satisfaction.

These policy statements will be effective immediately. Further clarification, if necessary, will be provided through specific guidance to the field.

/s/Robert F. Burford

4360 FIRE MANAGEMENT

CURRENT MANAGEMENT SITUATION

LIST OF OVERLAYS

Fire Occurrence.

RESOURCE OVERVIEW

Fires on the public lands have either natural or human causes. Natural fires are almost always ignited by a lightning strike. Human caused fires may be (1) deliberately set for land treatments, weed control, etc.; (2) escaped fires, such as from campfires; or (3) accidental fires, such as ignited by sparks.

Present fire management generally consists of suppressing all fires. Fire crews are maintained during the fire season (June 1 to September 30) at the resource area and district offices.

MANDATES AND AUTHORITIES FOR RESOURCE MANAGEMENT

National Laws

FLPMA mandates that the public lands be managed for protection of environmental quality and sustained yield of renewable resources. This is the basis for the Bureau's overall fire suppression policy.

Other laws that indirectly affect fire management include the Endangered Species Act of 1973, the Antiquities Act of 1906, and the Archaeological Resources Protection Act of 1979.

Bureau Manuals

7110.16	Close and effective coordination are required to ensure that fire control methods are designed to minimize damage to land and water resources while meeting fire control objectives.
9210	The Bureau's general policy states that wildfires will be suppressed to minimize total resource loss, suppression costs, and environmental damage. It also states that limited suppression may be planned far in advance of actual wildfires and that prescribed fire may be used as a management tool when conducted within parameters identified in a prescribed fire plan.

RESOURCE ALLOCATIONS

Fire management is allocated by designating areas through the RMP process for prescribed fires, limited suppression, or full suppression.

CURRENT MANAGEMENT PRACTICES AND PLANNING GUIDANCE

The resource area averaged 13 fires per year between 1980 and 1984. Table 4360-1 summarizes the fire size, cause, value at risk, and vegetation type. (cross reference: Vegetation, Part I.)

Fires in this same 5-year period occurred as early as May 12 and as late as September 6, most between June 1 and August 15.

Two-thirds of the fires were caused by lightning, and one-third were caused by man. Most of the fires burned less than 0.25 acre and consisted of one or two pinyon or juniper trees. Most of these fires did not spread from the point of ignition.

Specific information on individual fires is available in fire reports filed in the Moab District BLM office.

The present resource area policy is to suppress all fires. No areas are formally designated for prescribed fires or modified suppression. Fire suppression in WSAs is limited to foot travel and hand tools, unless the Area Manager determines that vehicular travel and heavy equipment are necessary to protect life or valuable property.

Fire management in the four MFPs is mentioned as part of the forest products activity. Most of the MFPs record a decision to suppress wildfires to maintain the pinyon-juniper vegetative type. The Indian Creek-Dry Valley MFP, the most recent plan, has a decision to complete a fire management plan to identify areas for full fire suppression and areas where fire would be allowed. Such a plan has not been prepared.

SOCIOECONOMIC CONSIDERATIONS

The following discussion concentrates on San Juan County, which is the primary impact area. Although public land related activities can affect other areas in southeastern Utah and southwestern Colorado, the preponderance of effects for most activities is confined to San Juan County. For a more complete description of the methodologies and assumptions used in this chapter, refer to the Economic Methodology section in Part III.

The fire program's local importance is determined by its effects on local economic activities. According to fire reports from 1980 to 1984, fire related resource damages have averaged $3,800 per year and $225 per fire. However, the procedures used to compile these reports grossly exaggerate resource damages and do not account for fire related benefits. Actual fire damages have therefore been far less. There have been no recorded fire damages to capital investments, and all the private property damages recorded over the past 5 years have been from fires originating on private lands. The existing fire suppression policy does not appear to be affecting local economic activity. The degree to which local economic activity would be affected under a different suppression policy, or with no suppression, cannot be determined. Therefore the program's importance in preserving existing local economic activity cannot be determined.

TABLE 4360-1

Fire Characteristics

Calendar Year	Total Fires	Number By Size[a]	Number By Cause[b]	Number By Risk[c]	Number by Vegetative Type
1984	11	9 A	4 M	3 Low	9 Pinyon-Juniper
		2 B	7 L	7 Moderate	1 Sagebrush-Grass
				1 High	1 Grass
1983	8	7 A	2 M	6 Moderate	8 Pinyon-Juniper
		1 B	6 L	2 High	
1982	14	14 A	7 M	3 Low	14 Pinyon-Juniper
			7 L	11 Moderate	
1981	13	6 A	13 L	10 Low	13 Pinyon-Juniper
		4 B		3 Moderate	
		2 C			
		1 D			
1980	21	15 A	3 M	3 Low	21 Pinyon-Juniper
		3 B	18 L	16 Moderate	
		2 C		2 High	
		1 D			

[a] Size: A = 0 to 0.25 acres; B = 0.26 to 9 acres; C = 10 to 99 acres; D = 100 to 299 acres; E = 300 to 999 acres.

[b] Cause: L = lightning; M = man.

[c] Risk: The value of the resource burned or threatened.

Positive or negative point values are given to each resource (i.e., range, wildlife, recreation, etc.) in an area, rating the importance of either protecting the resource from fire or allowing fire to consume the resource. These point values are totalled for each resource in an area to get an overall positive or negative numerical rating that equates to a value at risk (low to extreme). This rating can be used to determine the fire suppression policy for the area.

Fire suppression costs will be one of the considerations in formulating fire suppression policy. An analysis of historical suppression cost in the SJRA revealed some cost coding problems which prevented derivation of any relationships between suppression levels, fire characteristics, and cost. Over the past 5 years, 75 percent of the fires in the resource area burned less than an acre. The cost of suppressing these small fires was less than half the cost of suppressing fires of an acre or more (see table 4360-2). The cost of suppressing fires can be delineated between the labor and equipment cost incurred during fire suppression and the labor and equipment cost incurred to be ready to suppress fires (presuppression).

The cost of having fire crews and equipment ready to suppress fires varies little with fire activity. This fixed cost can change only if the level of preparedness and suppression ability is also changed. If presuppression costs were charged back to fire suppression, these costs would account for more than twice the actual cost of suppressing a fire (see table 4360-2). It should be noted that some of the labor cost charged to presuppression is not used for fire prepardedness, but for miscellaneous jobs benefiting other programs.

Existing policy in the SJRA is to fully suppress all fires. When an initial attack is unsuccessful, the Area Manager, after analyzing the fire, can decide to limit suppression. However, over the past 5 years, all fires in the SJRA have been fully suppressed. In theory, limited suppression is cheaper than full suppression. However, fires that are not fully suppressed last longer and burn a larger area. The variable cost of fully suppressing a small fire in a few hours is small and comparable to the cost of monitoring a fire for several days. There always remains a chance that a fire not fully suppressed will later require full suppression at a cost greater than that of an early full suppression. Whether or not limited suppression is cheaper cannot be projected and depends mostly on (1) the expense of an early full suppression; (2) the probability of having to later suppress the fire; and (3) the possibility of reducing presuppression costs.

Some of the government costs related to fire management contribute toward local sales, income, and employment. The governmental expenditures for local fire presuppression and suppression generate an estimated 5 jobs and $31,000 of personal income (see table 4360-3). Four of these 5 jobs are summer temporary work.

The fire management program affects local jurisdictional revenues and costs only as it affects other economic activities. Because no clear relationship between the fire program and other economic activities was identified, no fiscal effects were quantified.

CONSISTENCY WITH NON-BUREAU PLANS

The resource area cooperates on fire suppression with several other agencies such as the NPS, USFS, and State of Utah Forestry and Fire Control. The general policy is that the agency that can reach the fire most quickly takes initial attack responsibility and is relieved or assisted by the agency managing the land on which the fire occurs.

TABLE 4360-2

San Juan Resource Area's Average Fire Suppression Costs (1980 through 1984)
(1982 dollars)

	Average Variable Cost/Fire	Average Fixed Cost/Fire	Average Total Cost/Fire
Cost/fire, less than 1 acre	$ 298	$ 766	$ 1,064
Cost/fire, 1 acre or more	793	2,039	2,832
Average cost/fire	407	1,047	1,454
Average annual cost	5,535	14,235	19,770

Source: BLM Records

TABLE 4360-3

Local Importance of the SJRA Fire Program Related Costs (FY 1984, 1982 first quarter dollars)

Standard Industrial Code Sector	Estimated Cost of the Program (dollars)	Local Effect Income (dollars)	Local Effect Employment (jobs)
Public Administration	33,500	25,000	[b]4.3
Other Sectors[a]		6,000	0.7
Total		31,000	5.0

[a] Includes the direct, indirect, and induced effects of both government purchases of local goods and services and the local expenditures by government employees.

[b] Four of these employees are summer temporaries.

Source: BLM Records; USFS, 1982.

The other agencies mentioned have fire management plans covering lands they administer. Current BLM management is consistent with those plans.

DATA GAPS

None identified.

RESOURCE CAPABILITY ANALYSIS

PRESENT DEMAND AND CAPABILITY TO MEET DEMAND

The present demand for fire management is as shown in table 4360-1. The resource area is capable of meeting this demand. In FY 1984, 15 work months were spent on fire management (coded to 4610, Presuppression).

FUTURE DEMAND (UNTIL 2000) AND CAPABILITY TO MEET DEMAND

The future demand cannot be predicted. It is based on variables such as weather conditions (cross-reference: Climate, Part I); vegetation type (cross reference: Vegetation, Part I); and human use of an area. However, it is anticipated that future demand will, on the average, be similar to current demand, and that the resource area will be capable of meeting the demand. In the future, work months needed for fire management are not expected to increase.

CRITICAL THRESHOLDS

The critical threshold for air quality resources would be reached if fire management actions caused the secondary NAAQS to be exceeded (cross-reference: Soil, Water and Air, Part II).

It is reasonable to assume that a critical threshold would be reached if a certain percentage of the resource area burned in one season. However, this level is difficult to determine, and any figure determined for this level would be pure speculation. For this reason, critical thresholds will not be set in this analysis.

MANAGEMENT OPPORTUNITIES AND LIMITATIONS

ADEQUACY OF CURRENT MANAGEMENT

Current management does not provide for natural burns or limited fire suppression. No action plans have been prepared for such areas in SJRA. Otherwise, management appears adequate.

MANAGEMENT OPPORTUNITIES

Through the RMP, the resource area could identify fire suppression areas. These could allow for prescribed burns or limited fire suppression in certain areas (see table 4360-4).

TABLE 4360-4

Opportunities for Modified Fire Suppression

Recommended Suppression Level	Acreage	Location and Justification
Full suppression	305,000	Blanding-Montezuma Canyon area. Value at risk is high because of oil and gas facilities and intermingled and adjacent private lands. (Seedings in prescribed fire areas would be excluded from full suppression.)
Limited suppression	1,419,600	Most of SJRA. Value at risk is low to moderate in the remainder of the SJRA. The cost of full suppression is therefore not economically feasible.
Prescribed fire	54,600	Previously seeded areas. These areas (excluding 2,400 acres that have been treated since 1980) are in need of treatment to reduce trees and shrubs if the areas are to remain useful for grazing. Prescribed fire is an appropriate means of accomplishing this objective.

Action plans could be formulated after fire suppression areas are established. These would set the parameters for fire suppression actions for each suppression area.

ACEC POTENTIAL

No areas in SJRA qualify as an ACEC for fire management. An ACEC is designated to protect special values or recognize natural hazards. While fire management could be a tool to manage other special values in an ACEC, it does not qualify as a special value; and, while it may be a natural hazard, cannot be predicted or tied to a specific area in SJRA.

CONSTRAINTS FROM OTHER RESOURCE MANAGEMENT PROGRAMS

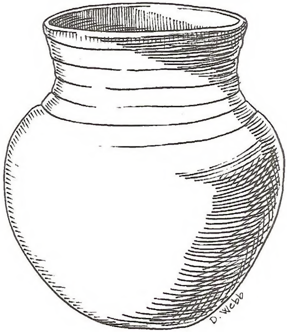
Management of cultural resources constrains fire management in that fire control lines must avoid cultural resources. While it is possible to avoid cultural properties when constructing fire control lines, the extra time required to determine whether such sites are present can delay suppression.

IMP constrains the type of suppression action that can be taken on approximately 387,000 acres or 20 percent of the resource area. Generally this means that suppression is with manpower and hand tools only. Fire vehicles, bulldozers, and fire retardant are used only after consultation with the Area Manager and IMP coordinator and if life or property are threatened.

DOCUMENTED PUBLIC CONTROVERSY

Fire management was an item of concern at public meetings held in April 1983 to identify issues for the San Juan RMP. Comments favored a "let burn" policy on most fires unless life or property were threatened. Documentation is in the resource area central files.

PART III
GENERAL INFORMATION



LIST OF ACRONYMS

ACEC	area of critical environmental concern
AMP	allotment management plan
APD	application for permit to drill
AQRV	air quality related values
AUM	animal unit month
BEA	Bureau of Economic Analysis
BEBR	Bureau of Economic and Business Research
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BOR	Bureau of Recreation
CFR	Code of Federal Regulations
CHL	combined hydrocarbon lease
CNP	Canyonlands National Park
CRMP	cultural resources management plan
CX	categorical exclusion
DOE	Department of Energy
DOGM	Division of Oil, Gas, and Mining (Utah)
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FLPMA	Federal Land Policy and Management Act of 1976
FWS	Fish and Wildlife Service
FY	fiscal year
GCNRA	Glen Canyon National Recreation Area
GNP	gross national product
HMP	habitat management plan
HUD	Housing and Urban Development
IBLA	Interior Board of Land Appeals
IM	instruction memorandum
IMP	Interim Management Policy
IORT	Institute of Outdoor Recreation and Tourism
IP	inhalable particulates
IPP	Intermountain Power Project
ISA	instant study area
KGS	known geologic structure
KPLA	known potash leasing area
KRCRA	known recoverable coal resource area
MDO	Moab District Office
MFP	management framework plan
MOU	memorandum of understanding
MSA	management situation analysis
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NF	national forest
NM	national monument
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service

LIST OF ACRONYMS (Continued)

NRA	national recreation area
NRDC	Natural Resources Defense Council
OAD	Organic Act Directive
OMB	Office of Management and Budget
ONA	outstanding natural area
ORV	off-road vehicle
OSM	Office of Surface Mining
P	primitive ROS class
PA	primitive area
PILT	payments in lieu of taxes
PP	physical profile
PRIA	Public Rangelands Improvement Act
PSD	prevention of significant deterioration
PWR	public water reserve
R	rural ROS class
RA	resource area
R&PP	recreation and public purpose
RMA	recreation management area
RMP	resource management plan
RN	roaded natural ROS class
RNA	research natural area
ROD	record of decision
ROS	recreation opportunity spectrum
RPS	rangeland program summary
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SIC	standard industrial code
SIP	state implementation plan
SJRA	San Juan Resource Area
SMCRA	Surface Mining Control and Reclamation Act
SPM	semiprimitive motorized ROS class
SPNM	semiprimitive nonmotorized ROS class
SRMA	special recreation management area
SSA	site-specific analysis
STSA	special tar sand area
TDS	total dissolved solids
U	urban ROS class
UDES	Utah Department of Employment Security
UDNR	Utah Department of Natural Resources
UDOT	Utah Department of Transportation
UDWR	Utah Division of Wildlife Resources
URA	unit resource analysis
USDA	U.S. Department of Agriculture
USDC	U.S. Department of Commerce
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USLE	universal soil loss equation
USO	Utah State Office
VRM	visual resource management
WO	Washington Office
WSA	wilderness study area

LIST OF ABBREVIATIONS

af	antelope fawning area
Aq/Rip	aquatic/riparian habitat
Bbl	barrels
BOPD	barrels of oil per day
C	Custodial allotment management category
cfs	cubic feet per second
CO	carbon monoxide
dbs	crucial desert bighorn sheep habitat
dw	crucial deer winter range
E.	east
F	Fahrenheit
I	Improve allotment management category
KCl	potassium chloride
K_2O	potash
M	Maintain allotment management category
mb	millibar
MCF	thousand cubic feet
mg/l	milligrams per litre
mg/m^3	milligrams per cubic centimeter
MMCF	million cubic fedet
MMCFGPD	million cubic feet of gas per day
mmhos/cm	millimhos per centimeter
m/sec	meters per second
NaCl	halite
NO_2	nitrogen dioxide
NOx	nitrous oxide
O_3	ozone
P.L.	Public Law
p/m	parts per million
R.	range
RO/BD	rock outcrop/badlands
R.S.	Revised Statute
S.	south
Sec.	Section
SO_2	sulphur dioxide
T.	township
U.C.A.	Utah Code Annotated
ug/m^3	micrograms per cubic meter
U.S.	United States

GLOSSARY

Acre-foot. The volume of material or water that will cover an area of 1 acre to a depth of 1 foot (43,560 cubic feet or 325,851 gallons).

Adjudication (grazing). The process of determining and apportioning qualifications for grazing preference of base properties offered to support applications for grazing permits.

Adjudication (lands). Legal processing of applications, entries, claims, etc., to assure full compliance with the public land laws and regulations.

Aeolian. Transported and deposited by wind.

Air pollution. Accumulation of aerial wastes beyond the concentrations that the atmosphere can absorb and, in turn, which may damage the environment.

Air quality classes. Classes established by the Environmental Protection Agency that defines the amount of air pollution considered significant within an area. Class I applies to areas where almost any change in air quality would be considered significant; Class II applies to areas where the deterioration normally accompanying moderate, well-controlled growth would be considered insignificant; and Class III applies to areas where deterioration up to the national standards would be considered insignificant.

Allotment. An area of land where one or more operators graze their livestock. Generally consists of public land but may include parcels of private or State lands. An allotment may consist of several pastures or be only one pasture.

Allotment management plan (AMP). A concisely written program of livestock grazing management, including supportive measures, if required, designed to attain specific management goals in a grazing allotment.

Alluvial. Relating to or formed by water carrying and depositing rocks, soil, and other materials.

Ambient air quality. Prevailing condition of the atmosphere at a given time; the outside air. Concentration levels in the outside air for a specified pollutant and a specified averaging time period within a given area.

Animal unit month (AUM). The amount of forage necessary for the sustenance of one cow or five sheep for 1 month.

Anticline. Applied to strata which dip in opposite directions from a common ridge or axis.

Aquifer. An underground body of rock or similar material capable of storing water and transmitting it to wells or springs (including both the saturated and unsaturated parts of the permeable unit).

Aquifer recharge. The process of refilling an aquifer from which water has been drawn.

Arkosic. Having considerable feldspar in its makeup.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Base property. Those lands in a ranching enterprise which are owned or under long-term control of the operator and have the capability to sustain the number of livestock for a specified time period for which a grazing privilege is sought (base property requirement).

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Biomass. The amount of living matter in a specified area.

Browse. As a verb, to consume, or feed or eat on (a plant); as a noun, the tender shoots, twigs, and leaves of trees and shrubs often used as food by cattle, deer, elk, and other animals.

Brush. Vegetation consisting primarily of bushes and shrubs, usually undesirable for livestock or timber management. It may sometimes be of value for browse or for watershed protection.

Butte. An isolated hill with steep sides and a top that is flat.

Carrying capacity (Grazing). The maximum stocking rate possible without inducing damage to vegetation or related resources such as watershed. Normally expressed in terms of acres per AUM, or sometimes referred to as the total AUMs that are available in any given area, such as an allotment.

Carrying capacity (Recreation). The maximum number of people at one time that an area or faciltiy can accommodate without impairing the natural, cultural, or developed resource.

Census county division (CCD). A geophric area defined by the Census Bureau in cooperation with State and county officials for the purpose of presenting statistical data. The CCDs have generally been designed to represent community areas focused on trading centers, or to represent major land use areas, and to have visible, permanent, and easily described boundaries.

Chloride. The anion (negatively charged particle) of the chemical element chlorine. This anion is present in water and in high concentrations, can be objectionable to taste and have a deleterious effect on metal fittings and on agricultural plants.

Classic. Composed principally of broken fragments that have been derived from pre-existing rocks.

Classification. Designation of public lands as being valuable, or suitable, for specific purposes, uses, or resources.

Climax vegetation. The final vegetation community that emerges after a series of successive vegetational stages. The climax community perpetuates itself indefinitely unless disturbed by outside forces.

Communitization agreement. An arrangement which allows the bringing together of a sufficient number of leases to provide enough acreage for wells to be drilled under state spacing requirements.

Consumptive use (of water). Withdrawing water from a supply that, because of absorption, transpiration, evaporation, or incorporation in a manufactured product, is not returned directly to a surface or ground water supply; hence, water is lost for immediate further use.

Contrast. The effect of a striking difference in the form, line, color, or texture of an area being viewed.

Contrast rating. A method of determining the extent of visual impact of an existing proposed activity that will modify any landscape feature.

Corridor. A linear strip of land forming a passageway between two points in which transportation and/or utility systems exist or may be located.

Cretaceous. A geologic period, noted for widespread oceans, that began about 135 million years ago and ended about 65 million years ago. Dinosaurs and many other species became extinct at the close of this period.

Critical wildlife habitat. That portion of the living area of a wildlife species that is essential to the survival and perpetuation of the species, either as individuals or as a population.

Cropland. Land used primarily for the production of cultivated crops, close-growing crops, and fruit and nut crops.

Cuesta. A hill or ridge with a steep face on one side and a gentle slope on the other.

Cultural clearance. A statement, based upon an inventory, that a given tract of land contains no cultural resource values or that, if cultural resources are present, compliance actions will be undertaken and other adverse impacts on them sufficiently mitigated.

Custodial management. A limited form of resource management employed on lands with low resource production potential that are producing near potential and where opportunities for positive economic return on public investment do not exist.

Deferred rotation grazing. Seasonal deferment of grazing among pastures in an allotment so that each pasture is deferred during each season. This permits seed production, establishment of seedlings, or restoration of plant vigor.

Demand. The amount of a good or service that users are willing to take at a specified price, time period, and condition of sale.

De minimis. Prevention of significant deterioration standards for pollutants besides total suspended particulate matter (TSP) and sulfur dioxide (SO_2).

Direct effect. Changes in sales, employment, or income of a firm that result directly from a firm's change in output.

Directional drilling. Slant drilling or drilling at an angle. Directional drilling is sometimes utilized when the operator is not allowed to occupy the surface of a given tract of land, but still wishes to drill a structure or target beneath that tract.

Dispersion Characteristics. Distinguishing physical features that determine how a pollutant is distributed over a given area.

Distance zone. The area that can be seen from a travel route as foreground-middleground (up to 3 to 5 miles), background (from foreground-middleground up to 15 miles), and areas which are seldom seen (or beyond 15 miles).

Diurnal. By day.

Drainage basin. An area bounded by a water parting and drained by a particular river and its tributaries (watershed).

Drought. The condition of moisture deficit sufficient to have a temporal adverse effect on vegetation, animals, and man over a sizable area; a prolonged lack of precipitation less than average; a prolonged weather condition characterized by deficient moisture and increased evaporation; climatic excursion involving a shortage of precipitation sufficient to adversely affect crop production or range productivity.

Ecological condition. The present state of vegetation of a rangesite in relation to the climax (natural potential) plant community for that site. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the climax plant community.

Economic impact. The change, positive or negative, in economic conditions (including distribution and stability of employment and income in affected local and regional economies) that directly or indirectly result from an activity, project, or program.

Ecotone. The effect achieved where two habitat types come together. The edge between the two merging types will be more favorable as wildlife habitat than either type considered alone.

Employment. labor input into a production process, measured in the number of person-years or jobs. A person-year is 2,000 working hours by one person working yearlong or by several persons working seasonally.

Endangered animal species. Any animal species in danger of extinction throughout all or a significant portion of its range. This definition excludes species of insects that the Secretary of the Interior determines to be pests and whose protection under the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man. See Threatened animal species.

Endangered plant species. Species of plants in danger of extinction throughout all or a significant portion of their ranges. Existence may be endangered because of the destrcution, drastic change, or severe curtailment of habitat, or because of overexploitation, disease, predation, or even unknown reasons. Plant taxa from very limited areas (e.g., the type localities only), or from restricted fragile habitats usually are considered endangered. See Threstened and sensitive plant species.

Ephemeral stream. A stream that flows only briefly after a storm or during snowmelt. See Perennial stream.

Erosion. The group of natural processes including weathering, dissolution, abrasion, corrosion, and transportation, by which earthy or rocky material is removed from any part of the earth's surface.

Evaporite deposit. Nonclastic sedimentary rock composed primarily of minerals produced from a concentrated saline solution.

Excavation (archaeological). The scientifically controlled recovery of subsurface materials and information from a cultural site. Recovery techniques are relevant to research problems and are designed to produce maximum knowledge about the utilization of the site, its relation to other sites and the natural environment, and its significance in the maintenance of the cultural system.

Exchange-of-use. An agreement made with a permittee haviang ownership or control of nonfederal land interspersed and grazed in conjunction with surrounding Federal range. This agreement specifies the carrying capacity that gives the Bureau control of the nonfederal land for grazing purposes.

Exotic plants. Those plant species that are not native to an area.

Fallow agriculture. A moisture conservation practice in which a crop is planted one year, followed by one or more years of clean cultivation or dust mulching before planting another crop.

Fire management. The integration of fire protection, prescribed burning, and fire ecology knowledge into multiple use planning, decision making, and land management activities. Fire management is not a program of letting fires burn. Fire management places fire in perspective with overall land management objectives to fulfill the needs of society.

Flood peak. The highest value of the stage or discharge attained by a flood; thus, peak stage or peak discharge.

Floodplain. The flat ground along a stream covered by water at the flood stage for a given interval (i.e., a 500-year floodplain will be larger than a 100-year floodplain).

Fluviatile. Transported by, suspended in, or laid down by a river stream.

Forage. Vegetation of all forms available for animal consumption.

Forb. A broadleaved herb other than grass; a weed..

Formation. A distinctive layer or group of layers in a stratigraphic sequence that are most frequently tabular in shape and are mappable at the earth's surface or traceable in the subsurface.

Geophysical. The measurement and interpretation of characteristics such as specific gravity, electrical conductivity, and magnetic susceptibility to determine the geologic properties of the earth's subsurface.

Grazing preference. The total number of animal unit months of livestock grazing on public lands apportioned and attached to base property owned or controlled by a permittee or lessee. Active preference and suspended preference combined make up total grazing preference

Grazing system. A systematic sequence of grazing use and nonuse of an allotment to reach identified multiple use goals or objectives by improving the quality and quantity of the vegetation.

Ground water Water filling the unblocked pores of underlying material below the water table.

Habitat. A specific set of physical conditions that surround the single species, a group of species, or a large community. In wildlife managment, the major components of habitat are considered to be food, water, cover, and living space.

Hydrocarbons. Organic chemical compounds of hydrogen and carbon atoms which form the basis of all petroleum products.

Hydrogeologic. Hydrology as it relates to geologic strata.

Igneous. Rock of interlocking minerals formed by the cooling and solidification of lava or magma.

Impact. A change in the ecosystem resulting from or accelerated by human action.

Income. Employee compensation, profits, rents, and other payments to households.

Indirect effect. Economic impacts that result when supporting industries sell goods or services to directly affected industries or businesses.

Indirect or induced employment. Employment in all sectors of a regional economy which results from an increase or decrease in direct employment.

Induced effect. Economic impacts that result when employees or owners of directly or indirectly affected industries spend their income within the economy.

Infrastructure. The basic transportation systems, utilities, services, enterprises, and other investments necessary for the operation and growth of a community.

Input-output model. An economic model of the interdependence of the producing and consuming sectors in a given area.

Insolation. Incoming solar radiation received at the earth's surface.

Instant study area (ISA). All public lands that were formally designated as natural or primitive areas before November 1, 1975. These areas are being considered for designation as wilderness areas and, if designated, would be included in the National Wilderness Preservation System (NWPS).

Integral vista. A viewshed, or area of view, from a pristine location, such as from a Class I area, that has been identified as being an important attribute to the area from which it is being viewed and that is worthy of protection to maintain its exceptional quality.

Interim management policy (IMP). An interim measure governing uses on lands under wilderness review. This policy protects wilderness study areas (WSAs) from impairment of their suitability for designation as wilderness.

Intrusion (visual). A land, vegetation, or sturctural feature that is generally considered out of context with the characteristic landscape.

Isopleth. A line connecting points at which a given variable has a constant value.

Isolated tract. A parcel of vacant public lands surrounded by private lands.

Jurassic. A geologic period that began about 180 million years ago and ended about 135 million years ago.

Known geologic structure (KGS). A natural underground reservoir capable of holding oil and gas and verified to be productive or capable of production.

Labor force. Consists of persons 16 years of age and older (excluding those institutionalized) who are currently employed or seeking employment.

Land disposal. A transaction that leads to the transfer of title of public lands from the Federal Government.

Land treatment. Alteration of the soil and/or vegetation of an area by mechanical, biological, or chemical means, or by burning.

Lifestyle. The characteristic way people live, indicated by consumption patterns, work, leisure, and other activities.

Limited suppression. A policy of limiting fire suppression activity in areas where the expense associated with usual suppression procedures is not warranted (usually because of extreme suppression difficulty or because the values threatened are low).

Lithic scatter. An archaeological site characterized by the presence of flaked stone.

Lithology. A description of rocks, especially sedimentary rocks, on the basis of color, structure, mineralogy, and grain size.

Livestock distribution. The uniformity of livestock grazing use over a range area. It is affected by availability of water, by topography, and by type and palatability of vegetation.

Mesozoic era. Era of geologic history extending from the start of the Triassic period (230 million years ago) to the end of the Cretaceous period (65 million years ago).

M, I, and C categorization. The grouping of allotments into three different categories (M=maintain, I=improve, and C=custorial) for management purposes.

Midden. An accumulation of refuse about a cultural site.

Millibar. A unit of pressure used to measure atmospheric pressure. Measured from an instrument called a barometer.

Mitigating measures. Methods used (often included as lease stipulations) to reduce the significance of or eliminate an anticipated environmental impact.

Mixing height. Height of the layer of air where well-mixed conditions exist, usually the hieght of the first significant inversion above the surface.

Modeling. A simulation technique for artificially imposing physical characteristics of an area onto some parameter to determine what the interaction between the parameter and the environment will be without acctually observing and measuring the interaction. Air quality modeling typically takes expected pollutant emissions from a proposed source and predicts concentrations of the pollutant in the air at various distances.

Monitor. To scrutinize or check systematically with a view to collecting certain specified categories of data.

Monocline. A unit of strata that dips or flexes from the horizontal in one direction only and is not part of an anticline or syncline.

Multiple use. Management of public lands and their various resource values so that they are used in the combination best meeting the present and future needs of the American people. Relative resource values are considered, not necessarily the combination of uses that will give the greatest potential economic return or the greatest unit output

Multiplier effects. The indirect and induced effects resulting from a direct effect.

National ambient air quality standards (NAAQS). National standards, established under the Clean Air Act by the Environmental Protection Agency (EPA), prescribing levels of pollution in the outdoor air which may not be exceeded.

National Register of Historic Places. A list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior.

National Register property. A site district, building, structure, or object deemed significant in American history, architecture, archaeology, or culture which is identified on the National Register of Historic Places.

National Wilderness Preservation System (NWPS). A system composed of Federally owned areas designated by Congress as Wilderness Areas. these areas shall be administered for the use and enjoyment of the American people; managment actions will preserve wilderness values for future use and enjoyment.

Nephelometer. An istrument for studying the density of suspended particles in a liquid by measuring scattered light.

Nonconsumptive use (of water). The act or process of using water that does not reduce its volume; the utilization of water in the process of producing a product which results in no deterioration of quantity or quality or transformation of water; primarily involves instream flow.

Notice of intent. A notice submitted to BLM by a geophysical exploration company that outlines a proposed oil and gas exploration program. Also the notice submitted for miining or mining exploration where fewer than 5 acres will be disturbed.

Obligations. Total resource management program expenditures, including costs of the operation plan, equipment, and work months.

Off-road vehicle (ORV). Any motorized vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain, excluding (1) any nonamphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorizing officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used in times of National defense emergencies. (Quoted from Executive Order 11989.)

Paleontology. The study of fossils.

Paleozoic era. An era of geologic history extending from the start of the Cambrian period (620 million years ago) to the end of the Permian period (230 million years ago).

Particulate matter. Any material, except water, in a chemically uncombined form that is or has been airborne and exists as a liquid or solid at standard temperature and pressure conditions. Minute particles of coal dust, fly ash, and oxides temporarily suspended in the atmosphere.

Pasquill stability class. Stability classes as defined by Dr. F. Pasquill of the British Meteorological Service, including extremely unstable, unstable, slightly unstable, nuetral, slightly stable, and stable.

Pasture. As used in this document, a subdivision of a grazing allotment.

Pediment. A broad, flat or gently sloping, rock-floored erosion surface or plain of low relief.

Pennsylvanian. A geologic period that began about 320 million years ago and ended about 250 million years ago. This period is known for huge insects and swampy forests that eventually became coal deposits. The period is sometimes called the Upper Carboniferous.

Perennial stream. A stream that flows throughout the year.

Permeability (soil). The ease with which gases or liquids penetrate or pass through soil.

Permian. A geologic period that began about 280 million years ago and ended about 225 million years ago. Many species became extinct at the close of the period.

Petroglyph. Prehistoric rock art cut or pecked into a stone surface.

Pictograph. Prehistoric rock art drawn or painted onto a stone surface.

Placer claim. A mining claim on a surficial mineral deposit formed by the mechanical concentration of mineral particles from weathered debris.

Plant vigor. The relative well-being and health of a plant as reflected by its ability to manufacture sufficient food for growth and maintenance.

Plume blight. Visible streams of materials or heated gases entering the atmosphere from a localized source such as a stack. An expression used to describe the obstruction to exceptional views caused from such streams.

Potentiometric. The imaginary surface, contouring to the elevations to which water will rise in wells penetrating an artesian aquifer.

Pot hunting. Illegal excavation resulting in damage to and destruction of a cultural site.

Powersite. Public lands that have a potential value for water power development.

Precambrian. The extremely long period of earth's geologic history which lasted from the first cooling of the molten crust to the appearance of the first masses or organic life with hard shells--a total of nearly 4 billion years ending 600 million years ago.

Precipitation. As used in hydrology, precipitation is the discharge of water, in liquid or solid state, out of the atmosphere, generally upon a land or water surface.

Primary NAAQS: standard set at a level to protect the public health from damage from air pollution. Secondary NAAQS: standard set at a level to protect public welfare from damage from air pollution.

Primitive area. Public land area, designated by the BLM as a Primitive Area, to be managed in a manner that protects the area's primitive recreational values.

Primitive recreation. Nonmotorized and undeveloped types of outdoor recreational activities.

Prior stable population. This number is derived from consideration of deer population dynamics data averaging 10 or more years when deer populations were stable. this level is at the range's carrying capacity for a given deer herd unit.

Propensity to consume. The proportion of a consumer's personal income that is spent on goods and services.

Proprietor. Owner of enterprises.

Public lands. Any lands or interest in lands outside Alaska owned by the United States and administered by the Secretary of the Interior through the BLM, except lands located on the Outer Continental Shelf or lands held for the benefit of Indians.

Quarternary. The last 2 million years of earth's geologic history.

Range Improvement. A structure or practice that increases forage production, improves watershed and range condition, or facilitates management of the range or the livestock grazing on it.

Rehabilitation. Restoration of damaged or lost environment as nearly as possible to its origial state.

Research design (cultural). An explicit plan for solving a problem or a set of problems. It is a plan that must contain theoretical goals in the form of a specific problem or hypothesis, relevant analytical variables, and specification of data that will allow empirical testing.

Resource managment plan (RMP). A written lands use plan that outlines BLM's decisions and strategies for managment of the resources in a particular area. The RMP is replacing the managment framework plans (MFPs) in BLM's planning system.

Rest. Refers to seasonal resting from grazing of a range to allow plants to replenish their food reserves, seeds to ripen, seedlings to become established, and litter to accumulate between plants.

Rest-rotation grazing system. A grazing system providing for systematic and sequential grazing by livestock and resting from livestock use on a range area to provide for the production of livestock while simultaneously maintaining or improving the vegetation and soil fertility.

Return above cash cost. Annual sales minus those costs that must be paid that same year.

Return on labor and investment. annual sales minus the cost that must be paid that same year, and the depreciation incurred on capital equipment.

Right-of-way. The legal right for use, occupancy, or access across land or water areas for a specified purpose or purposes. Such use on Federal land is authorized by permit, lease, easement, or license. Also, the lands covered by such an easement or permit.

Riparian habitat. A unique and specialized form or wetland restricted to areas along, adjacent to, or contiguous with, perennially and intermittently flowing rivers and streams and other bodies of water.

Saline soil. Soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. Total dissolved solids in water after all carbonates have been converted to oxides, all bromide and iodide have been replaced by chloride, and all organic matter has been oxidized.

Scenic quality. The visual aesthetics of an area, based on the key factors: landforms, vegetation, color, water, influence of adjacent scenery, scarcity, and amount of cultural modification. It indicates the visual quality of an area relative to other scenery in the region. BLM ratings are A (exceptional/extraordinary B (high), and C (low/common).

Season of use. The time of livestock grazing on a range area based on type and stage of vegetative growth.

Sediment. Soil or mineral material transported by water and deposited in streams or other bodies of water.

Sediment yield. The total amount of eroded material that completes the journey from its source to a downstream control point, such as a reservoir.

Segregation. Generally speaking, any action such as withdrawal, which suspends the operation of the general public land or mineral laws on particular public lands.

Sensitive animal species. Species not yet officially listed but undergoing status review for listing on the official Fish and Wildlife Service (FWS) Threatened and Endangered Species List; species whose populations are small and widely dispersed or restricted to a few localities; and species whose numbers are declining so rapidly that official listing may be necessary.

Sensitive plant species. Plants whose populations are consistently small and widely dispersed or whose ranges are restrictesd to a few localities, such that any appreciable reduction in numbers, habitat avialability, or habitat condition might lead toward extinction. Sensitive plants also include species rare in one locality (such as in Utah) but abundant elsewhere. See Endangered plant species and Threatened plant species.

Sensitivity level (visual). An index of the level of response to visual change in an area based on such weighted criteria as social attitudes, amount of use, types of resource uses, management attitudes, etc. Levels are classified as high, medium, or low.

Shrub. A plant that has a persistent woody stem, a relatively low growth habit, and generally produces several basal shoots instead of a single trunk.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Special tar sand area (STSA). An area designated by order of the Secretary of the Interior on November 20, 1980 (45 Federal Register 76800) and January 21, 1981 (46 Federal Register 6077), and referred to in those orders as designated tar sand areas, as containing substantial deposits for tar and sand. Eleven STSAs are recognized in Utah by the Combined Hydrocarbon Leasing Act of 1981. the Act provided for the conversion of existing oil and gas leases in STSAs to combined hydrocarbon leases (CHLs). this Act also requires competitive leasing for currently unleased lands within STSAs.

Stabilization (cultural). Protective techniques usually applied to structures and ruins to keep them in their existing condition, prevent further deterioration, and provide structural safety without significant rebuilding.

Stipulation. A condition or requirement attached to a lease or authorization, usually dealing with protection of the environment.

Sulfates. Chemical compounds consisting of various cations combined with the sulfate anion (SO_4^{2}).

Surface water. All forms of water on the surface of the earth.

Tertiary. The earth history period extending from the close of the Age of Reptiles (about 65 million years ago) to the onset of the Ice Ages (2 million years ago).

Threatened animal species. Any animal species likely to become endangered within the foreseeable future throughout all or a significant part of its range See Endangered animal species.

Threatened plant species. Species of plants that are likely to become endangered within the foreseeable future throughout all or a significant portion oftheir ranges, including species categorized as rare, very rare, or depleted. See Endangered plant and Sensitive plant species.

Topography. The relief and contour of the land, especially when taken collectively, as over a region or large area.

Total dissolved solids (TDS). Salt--an aggregate of carbonates, bicarbonates, chlorides, sulfates phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts. High TDS solutions can change the chemical nature of water. High TDS concentrations exert varying degrees of osmotic pressures and often become lethal to life in an aquatic environment.

Total suspended particulates (TSP). All solid or semisolid material found in the atmosphere.

Transmissivity. A measure of permeability and ability of a material to transmit water. Equal to the hydraulic conductivity (permeability) times the aquifer thickness.

Triassic. A geologic period that began about 225 million years ago and ended about 195 million years ago.

Unemployment. The sum of persons in the labor force who are currently unemployed but who are looking for work, and those who are on layoff or waiting to start new jobs within 30 days.

Visitor Day. twelve visitor hours which may be aggregated continuously, intermittently, or simultantously by one or more persons.

Visual distance zone. The expression of the normal distance of viewers from an area being viewed: foregroun/middleground (up to 5 miles); background (up to 15 miles); and seldom seen (greater than 15 miles or areas screened from normal viewpoints).

Visual elements (basic). The elements that determine how the character of a landscape is perceived. Form: the shapes of objects such as landforms or patterns in the landscape. Line: perceivable linear changes in contrast resulting from abrupt differences in form, color, and texture. Color: the reflected light of differnt wave lengths that enables the eye to differentiate otherwise identical objects. Texture: the visual result of variation in the surface of an object.

Visual resources. The land, water, vegetation, animals, structures, and other features that are visible on all public lands.

Visual resource management (VRM) classes. Classification containing specific objectives for maintaining or enhancing visual resources, including the amount of acceptable change to the existing landscape to meet established visual goals.

Watershed. The total area above a given point on a stream that contributes water to the flow at that point.

Water table. The upper level of an underground, unconfined water body.

Wetlands. Lands including swamps, marshes, bogs, and similar areas such as wet meadows, river overlflows, mud flats, and natural ponds.

Wilderness management policy. The BLM policy that governs administration of public lands designated as wilderness areas by Congress. It is based on the Wilderness Act of 1964 and the Federal Land Policy and Management Act (FLPMA) of 1976. FLPMA requires a wilderness area to be a roadless area or island that has been inventoried and found to have wilderness characteristics as described in Section 603 of FLPMA and in Section 1(c) of the Wilderness Act.

Wilderness study area (WSA). An area under study for possible inclusion as a wilderness area in the National Wilderness Preservation System (NWPS).

Wildlife. All species of mammals, birds, fish, amphibians, and reptiles found in a wild state.

Wildlife habitat. All elements of a wild animal's environment necessary for completion of its life cycle. these elements include food, cover, water, and living space.

Wilding. A wild plant used for ornametal or medicinal purposes.

Withdrawal. An action that restricts the use of public lands and segregates the land from operation of some or all of the public land or mineral laws.

Work month. A unit containing 173.3 hours of government labor.

Yellowcake. Light green or yellow colored uranium oxide compound that is the end product of uranium milling.

LIST OF APPLICABLE LAWS

The following are federal laws that either are referenced in the MSA or are applicable to management of public lands and resources in the SJRA. The laws are arranged by subject, as codified in the titles of the U.S.C. (1982). The U.S.C. section referenced is that believed to be most applicable, but may not include all sections of the statute. Common names of laws are given in parentheses. This list is provided for the convenience of the reader, and is not meant to include all laws pertaining to management of public lands and resources, or to imply that laws or amendments not listed are not relevant to public lands management.

Name	Codification	Statute	Public Law
Title 16 - Conservation			
The Act of August 25, 1916 (The National Park Service Organic Act)	16 U.S.C. 1 et seq.	39 Stat. 535	Aug. 25, 1916, P.L. 235, ch. 408
An Act to Establish Canyonlands National Park (September 12, 1964)	16 U.S.C. 271	78 Stat. 937	P.L. 88-590
The Act of June 8, 1906 (Antiquities Act of 1906)	16 U.S.C. 431 et seq.	34 Stat. 225	June 8, 1906, P.L. 209, ch. 3060
The Land and Water Conservation Fund Act of 1965 (Sept. 3, 1964)	16 U.S.C. 460*l*-4 et seq.	78 Stat. 897	P.L. 88-578
An Act to Establish the Glen Canyon National Recreation Area in the States of Arizona and Utah (Oct. 27, 1972)	16 U.S.C. 460 dd	86 Stat. 1311	P.L. 92-593
The Federal Water Projects Recreation Act (July 9, 1965)	16 U.S.C. 460*l*-12 et seq.	79 Stat. 213	P.L. 89-72
The Water Resources Development Act of 1974 (March 7, 1974)	16 U.S.C. 460*l*-13 et seq.	88 Stat. 16	P.L. 93-251
The Act of Aug. 21, 1935 (Historic Sites, Buildings, and Antiquities Act)	16 U.S.C. 461 et seq.	49 Stat. 666	Aug. 21, 1935, P.L. 292 ch. 593

LIST OF APPLICABLE LAWS (Continued)

Name	Codification	Statute	Public Law
Title 16 - Conservation (Concluded)			
The Reservoir Salvage Act of 1960	16 U.S.C. 469 et seq.	74 Stat. 220	P.L. 86-523
The Reservoir Salvage Act Amendment of May 24, 1974 (Archaeological and Historic Preservation Act of 1974)	16 U.S.C. 469 et seq.	88 Stat. 174	P.L. 93-291
The National Historic Preservation Act (October 15, 1966), as amended	16 U.S.C. 470 et seq.	80 Stat. 915	P.L. 89-665
The Archaeological Resources Protection Act of 1979 (Oct. 31, 1979)	16 U.S.C. 470aa et seq.	93 Stat. 721	P.L. 96-95
The Multiple-Use Sustained-Yield Act of 1960 (June 12, 1960) (National Forest lands)	16 U.S.C. 528 et seq.	74 Stat. 215	P.L. 86-517
The Soil Conservation and Domestic Allotment Act of 1935, as amended	16 U.S.C. 590a et seq.	49 Stat 164	April 27, 1935, P.L. 46, ch. 85
The Act of Sept. 28, 1962	16 U.S.C. 611	76 Stat. 652	P.L. 87-713
The Fish and Wildlife Coordination Act (March 10, 1934), as amended	16 U.S.C. 661 et seq.	48 Stat. 401	March 10, 1934, P.L. 121, ch. 55
The Fish and Wildlife Coordination Act Amendment of Aug. 12, 1958	16 U.S.C. 661 et seq.	72 Stat. 563	P.L. 85-624
The Act of June 8, 1940 (Bald Eagle Protection Act), as amended	16 U.S.C. 668 et seq.	54 Stat. 250	June 8, 1940, P.L. 567, ch. 278
The Act of Sept. 15, 1960 (The Sikes Act), as amended	16 U.S.C. 670a	74 Stat. 1052	P.L. 86-797
The Migratory Bird Treaty Act (July 3, 1918), as amended	16 U.S.C. 703	40 Stat. 756	July 3, 1918, P.L. 186, ch. 128

The Migratory Bird Treaty Act Amendments of June 20, 1936	16 U.S.C. 703 et seq.	49 Stat. 1556	June 20, 1936, P.L. 728, ch. 634
The Watershed Protection and Flood Prevention Act (Aug. 4, 1954), as amended	16 U.S.C. 1001 et seq.	68 Stat. 666	Aug. 4, 1954, P.L. 566, ch. 656
The Wilderness Act (Sept. 3, 1964)	16 U.S.C. 1131 et seq.	78 Stat 890	P.L. 88-577
The National Trails System Act (Oct. 2, 1968), as amended	16 U.S.C. 1241 et seq.	82 Stat. 919	P.L. 90-543
The Wild and Scenic Rivers Act (Oct. 2, 1968), as amended	16 U.S.C. 1271 et seq.	82 Stat. 906	P.L. 90-542
The Wild and Scenic Rivers Act Amendment of Jan. 3, 1975	16 U.S.C. 1276	88 Stat 2094	P.L. 93-621
The Act of Dec. 15, 1971 (The Wild Free-Roaming Horses and Burros Act)	16 U.S.C. 1331 et seq.	85 Stat. 649	P.L. 92-195
The Endangered Species Act of 1973 (Dec. 28, 1973), as amended	16 U.S.C. 1531 et seq.	87 Stat. 884	P.L. 93-205
The Endangered Species Act Amendment of Dec. 28, 1979	16 U.S.C. 1531 et seq.	93 Stat 1225	P.L. 96-159
The Soil and Water Resources Conservation Act of 1977 (Nov. 18, 1977)	16 U.S.C. 2001 et seq.	91 Stat. 1407 et seq.	P.L. 95-192

Title 25 - Indians

The Act of Feb. 8, 1887 (General Allotment Act), as amended	25 U.S.C. 331 et seq.	24 Stat. 388	Feb. 8, 1887, ch. 119
The Indian Mineral Development Act (December 22, 1982)	25 U.S.C. 2101 et seq.	96 Stat. 1938	P.L. 97-382

LIST OF APPLICABLE LAWS (Continued)

Name	Codification	Statute	Public Law
Title 25 - Indians (Concluded)			
The Act of Sept. 2, 1958 (provides for the exchange of mineral and other rights between the U.S. and the Navajo Indian tribe)	(not codified in U.S.C.)	72 Stat. 1686	
Title 29 - Labor			
The Act of Jan. 12, 1983 (Federal Oil and Gas Royalty Management Act of 1982)	29 U.S.C. 1701 et seq.	96 Stat. 2447	P.L. 97-451
Title 30 - Mineral Lands and Mining			
The Act of May 10, 1872 (The General Mining Law of 1872)	30 U.S.C. 22 et seq.	R.S. 2319 et seq.	May 10, 1872, ch. 152
The Act of Feb. 25, 1920 (The Mineral Lands Leasing Act), as amended	30 U.S.C. 181	41 Stat. 437	Feb. 25, 1920, P.L. 146, ch. 85
The Act of Aug. 4, 1976 (Federal Coal Leasing Amendment Act)	30 U.S.C. 201	90 Stat 1083	P.L. 94-377
The Combined Hydrocarbon Leasing Act of 1981, as amended (Nov. 16, 1981)	30 U.S.C. 226; 241	95 Stat. 1070	P.L. 97-78
The Act of Feb. 7, 1927 (The Potash Leasing Act)	30 U.S.C. 281 et seq.	44 Stat. 1057	Feb. 7, 1927, P.L. 579, ch. 66
The Mineral Leasing Act for Acquired Lands of 1947, as amended	30 U.S.C. 351 et seq.	61 Stat. 913	Aug. 7, 1947, P.L. 382, ch. 513

The Act of July 31, 1947 (The Material Sale Act)	30 U.S.C. 601 et seq.	61 Stat. 681	July 31, 1947, P.L. 291, ch. 406
The Act of July 23, 1955 (The Multiple Surface Use Act of 1955)	30 U.S.C. 601 et seq.	69 Stat. 367	July 23, 1955, P.L. 167, ch. 375
The Act of Aug. 11, 1955 (The Mining Claims Rights Restoration Act of 1955)	30 U.S.C. 621	69 Stat. 681	Aug. 11, 1955, P.L. 359, ch. 797
The Geothermal Steam Act of 1970	30 U.S.C. 1001 et seq.	84 Stat. 1566	P.L. 91-581
The Act of Aug. 3, 1977 (Surface Mining Control and Reclamation Act of 1977)	30 U.S.C. 1201 et seq.	91 Stat. 447	P.L. 95-87

Title 31 - Money and Finance

The Act of June 30, 1932 (The Economy Act of 1932) (substantially restated in P.L. 97-258, Sept. 13, 1982, 96 Stat. 933)	31 U.S.C. 1535 (formerly 31 U.S.C. 686)	44 Stat. 417	P.L. 72-211
Federal Grant and Cooperative Agreement Act of 1977 (Feb. 3, 1978)	31 U.S.C. 6301 et seq.	92 Stat. 3	P.L. 95-224

Title 33 - Navigation and Navigable Waters

The Federal Water Pollution Control Act Amendments of Oct. 18, 1972	33 U.S.C. 1151 et seq.	86 Stat. 816	P.L. 92-500
The Federal Water Pollution Control Act (Clen Water Act) (June 30, 1948), as amended	33 U.S.C. 1251 et seq.	86 Stat. 896 (62 Stat. 1155)	June 30, 1948, P.L. 845, ch. 758 (P.L. 92-500)
The Clean Water Act of 1977 (Dec. 27, 1977), as amended	33 U.S.C. 1251 et seq.	91 Stat. 1566	P.L. 95-217

LIST OF APPLICABLE LAWS (Continued)

Name	Codification	Statute	Public Law
Title 42 - The Public Health and Welfare			
The Safe Drinking Water Act (Dec. 16, 1974), as amended	42 U.S.C. 300f et seq.	88 Stat. 1660	P.L. 93-523
The Safe Drinking Water Act Amendments of 1977 (Nov. 16, 1977)	42 U.S.C. 300f et seq.	91 Stat. 1397	P.L. 95-190
The Water Resources Research Act of 1964 (July 17, 1964)	42 U.S.C. 1961 et seq.	78 Stat. 329	P.L. 88-379
Title 42 - The Public Health and Welfare (Continued)			
The Water Resources Planning Act (July 22, 1965)	42 U.S.C. 1961 et seq.	79 Stat. 244	P.L. 89-80
The Water Resources Development Act of 1974 (Mar. 16, 1974)	42 U.S.C. 1961 et seq.	88 Stat. 49	P.L. 93-251
The Water Resources Development Act of 1976 (Oct. 22, 1976)	42 U.S.C. 1962d-5d et seq.	90 Stat. 2917	P.L. 94-587
The American Indian Religions Freedom Act of 1978 (Aug. 11, 1978)	42 U.S.C. 1996 et seq.	92 Stat. 469	P.L. 95-341
The National Environmental Policy Act of 1969 (Jan. 1, 1970), as amended	42 U.S.C. 4321 et seq.	83 Stat. 852	P.L. 91-190
The Noise Control Act of 1972 (Oct. 27, 1972), as amended	42 U.S.C. 4901 et seq.	86 Stat. 1234	P.L. 92-574
The Solid Waste Disposal Act (Oct. 20, 1965), as amended	42 U.S.C. 6901 et seq. (formerly 42 U.S.C. 3251 et seq.)	79 Stat. 997	P.L. 89-272

The Clean Air Act (July 14, 1955)	42 U.S.C. 7401 et seq.	77 Stat. 392	July 14, 1955 P.L. 159, ch. 360 (P.L. 88-206)
The Clean Air Act Amendments of Dec. 17, 1963	42 U.S.C. 7401 et seq	77 Stat. 392	P.L. 88-206
The Clean Air Act Amendments of 1970 (Dec. 31, 1970)	42 U.S.C. 7401 et seq.	84 Stat. 1676	P.L. 91-604
The Clean Air Act Amendments of Aug. 7, 1977	42 U.S.C. 7401 et seq.	91 Stat. 685	P.L. 95-95
The Nuclear Waste Policy Act of 1972 (Jan. 7, 1983)	42 U.S.C. 10101 et seq.	96 Stat 2201	P.L. 97-425

Title 43 - Public Lands

The Taylor Grazing Act	43 U.S.C. 315 et seq.	48 Stat. 1269	June 28, 1934, P.L. 482, ch. 865
The Act of Mar. 3, 1877 (The Desert Land Entry Act), as amended	43 U.S.C. 321 et seq.	19 Stat. 377	Mar. 3, 1877, ch. 107
The Act of June 17, 1902 (The Reclamation Act), as amended	43 U.S.C. 371 et seq.	32 Stat. 388	June 17, 1902, P.L. 161, ch. 1093
The Upper Colorado River Basin Compact	43 U.S.C. 617*l*	63 Stat. 31	Apr. 6, 1949, P.L. 37, ch. 48
The Act of April 11, 1956 (Colorado River Storage Project Act)	43 U.S.C. 620 et seq.	70 Stat. 105	Apr. 11, 1956, P.L. 485, ch. 203
The Appropriations Act of 1952, McCarran Amendment	43 U.S.C. 666	66 Stat. 560	July 10, 1952, P.L. 495, ch. 651
The Act of June 1, 1938 (Small Tract Act of 1938), as amended	43 U.S.C. 682a	52 Stat. 609	June 1, 1938, P.L. 577, ch. 317
The Act of June 14, 1926 (Recreation and Public Purposes Act), as amended	43 U.S.C. 869 et seq.	44 Stat. 741	June 14, 1926, P.L. 386, ch. 578

LIST OF APPLICABLE LAWS (Concluded)

Name	Codification	Statute	Public Law
Title 43 - Public Lands (Concluded)			
The Act of July 26, 1866	43 U.S.C. 932	R.S. 2477	July 26, 1866, ch. 262
The Act of March 4, 1911 (repealed Oct. 21, 1976 by FLPMA, 43 U.S.C. 1701, 90 Stat. 2793, P.L. 94-579)	43 U.S.C. 961	36 Stat 1253	March 4, 1911, P.L. 478, ch. 238
The Classification and Multiple Use Act of Sept. 19, 1964 (terminated)	43 U.S.C. 1411 et seq.	78 Stat. 986	P.L. 88-607
The Act of June 24, 1974 (Colorado River Basin Salinity Control Act)	43 U.S.C. 1571 et seq.	88 Stat. 266	P.L. 93-320
The Federal Land Policy and Management Act (Oct. 21, 1976)	43 U.S.C. 1701 et seq.	90 Stat. 2743	P.L. 94-579
The Public Rangelands Improvement Act of 1978 (Oct. 25, 1978)	43 U.S.C. 1901 et seq.	92 Stat. 1803	P.L. 95-514
Title 49 - Transportation			
The Department of Transportation Act of 1966 (October 15, 1966), as amended (substantially repealed by P.L. 97-449, January 12, 1983, 90 Stat. 2413)	49 U.S.C. 1653	80 Stat. 931	P.L. 89-670

ECONOMIC METHODOLOGY

INTRODUCTION

Economic considerations for each resource management program included identification of related economic activities and analysis of (1) the local importance of those activities, (2) the fiscal importance of those activities to local taxing jurisdictions, and (3) the local importance of government expenditures related to each program. Some economic methodologies were used for all programs, and some were specific to a particular program. This section first discusses those methodolgies that were common to all programs.

GENERAL

Most resource management programs either regulate or affect some economic activities. These affected activities are usually obvious; however, some of the programs required a thorough review before affected economic activities could be identified. Whenever possible, the local employment, earnings, and personal income generated by these activities were derived from secondary sources such as statistics from the Bureau of Economic Analysis and the Utah Department of Employment Security (BEA, 1984; UDES, 1982).

When such statistics were not available for a particular activity, estimates were based on personal contacts with persons having particular knowledge of those activities.

An economic input-output model of the county was used to estimate the indirect and induced local importance of these activities. The economic model used a 1977 data base (USFS, 1982). Important economic sectors were updated using 1982 employment/output and sales/output ratios (BEA, 1984; UDES, 1982; USDC, 1984c; USDC, 1984d; USDC, 1984e; USDC, 1985). The data used by the economic model are not strictly comparable with BEA statistics.

To keep all economic statistics commensurable, BEA statistics were used whenever possible. Only employment multipliers were used from the county economic model. Earnings and personal income estimates were derived from BEA income/employment ratios.

Economic activities can affect the revenues and costs of local taxing jurisdictions. The fiscal importance calculations quantified the sales, use, and property tax revenues directly generated from an activity. The indirect and induced revenue effects were not calculated. For example, the sales and property taxes generated by a mine employee were not accounted for in the fiscal importance calculations of that mine.

Local sales, use, and property tax revenues collected by local taxing jurisdictions can be broken down by broad revenue source. More specific breakdowns were derived by apportioning revenues in proportion to each industry's economic activity. Economic activity was measured by either gross output or employment estimates. The accounting systems used by local taxing jurisdictions did not allow for a similar fiscal breakdown of the costs associated with identified activities.

The cost of managing BLM programs generates local employment and income through (1) direct manpower requirements of the program and (2) local purchases of supplies and materials required to manage the program. The work months charged to each management program in 1984 were used to estimate each program's direct manpower requirements. The work month figures were adjusted slightly to account for support programs, and the support work months were reallocated in proportion to each program's total obligations. These estimates were then used to estimate governmental jobs due to each program.

The effect of government employment on local sales was estimated based on national average propensities to consume, broken out by sector. If the local economy had a particular sector, it was assumed that residents made those sectoral purchases locally rather than outside the local economy.

Purchases from sectors nonexistent in the local economy were assumed to be made outside the local economy. The resulting local sales estimates were used in conjunction with the county model to estimate the indirect and induced effects of government employment.

All 1984 procurement expenditures were reviewed to estimate the proportions of local purchases. This proportion (35 percent) was applied to all procurement expenditures by program. These local expenditure estimates were then entered into the county economic model to derive the direct, indirect, and induced employment generated. The procurement figures were adjusted slightly to account for support programs and the discretionary allocation of fixed cost.

RECREATION

Although tourist related sales can generate a significant amount of local income and employment, the recreation industry is not delineated by standard economic statistics. Surveys on recreation trips and expenditures are conducted regularly by the Institute of Outdoor Recreation and Tourism (IORT, 1984; IORT, 1978; Dalton, 1982). (NOTE: IORT was formerly ISORT, the Institute for the Study of Outdoor Recreation and Tourism.) Results are usually published for broad geographic regions.

Statistics published for the geographic region including San Juan County usually include figures for Grand County, and sometimes for Carbon and Emery Counties as well. Separate studies are usually conducted for out-of-state tourists and those who reside in Utah. In order to estimate the local importance of recreational activities in San Juan County, it was necessary to apportion trips and revenues by county and to aggregate the out-of-state and in-state recreation statistics.

Using the previous ISORT studies, it was possible to separate the recreation statistics for the Carbon and Emery County area from those for the San Juan and Grand County area. A recent study by ISORT did break out out-of-state expenditures between Grand and San Juan Counties (SEUAOG, 1985). Another study associated with the Grand RMP analyzed the importance of all tourism to Grand county by examining historic seasonal variations in total sales, tourist room sales, and population changes.

Both of these studies concluded that Grand county accounts for 65 percent of total tourist sales in Grand and San Juan Counties. The 65 percent figure was used to apportion estimates of both expenditures and visitations between the two counties. This procedure has likely led to underestimating visitation to San Juan County, as it is widely believed that many of those visiting San Juan County purchase needed goods and supplies in Grand County.

Two methods were used to apportion the visitation and expenditures due to the SJRA: (1) BLM visitation estimates were compared to the total county visitation estimates, and (2) visitation estimates from all other land managing agencies were subtracted from the total county estimates; the difference was assumed to be the visitation due to recreation on public lands. The two procedures were judged necessary because of the inaccuracy associated with the BLM visitation estimates and the generally greater accuracy of visitation figures from other land managing agencies.

LIVESTOCK

Ranchers using BLM forage in the SJRA were stratified according to herd size, season of federal rangeland use, and dependency on federal lands for grazing. Data from the USDA cost of production survey, for a broad geographic area which included San Juan County, were adjusted to reflect local conditions. These adjustments were based on interviews with ranchers and university extension specialists.

Forage dependency estimates were based on BLM, USFS, and State of Utah grazing records; private leases recorded during the grazing fee appraisal; census estimates of privately produced forage; and a partial survey of local ranchers (USDC, 1984; Tittman and Brownell, 1984).

Estimated total herd size of ranchers using SJRA forage was based on BLM records and on responses to a mail-back questionnaire. Total herd size of local ranches and budget production data were used to estimate local sales due to those ranching operations using SJRA forage. Sales figures were input into the county economic model to derive indirect and induced effects.

FORESTRY

Calculating the local importance of harvesting firewood and Christmas trees required estimating the average local expenditure per unit of harvest. These figures (shown in table GI-1), along with harvest data, were input into the county economic model to derive employment and income estimates. Estimates of firewood expenditures per unit of harvest were based on partial fuelwood budgets developed by Johnson and Grosjean (1979) and Wagstaff (1984). Christmas tree expenditure estimates are simply a best guess of average travel distances and miscellaneous expenditures per tree harvested (see table GI-1).

Local fuelwood use estimates were based on the number of dwelling units in the county that use fuelwood as their major heating source and on the average household fuelwood consumption. Among those western rural households that use fuelwood for heat, average annual fuelwood consumption is 2.6 cords (Skog and Watterson, 1984). BLM employees in the SJRA who use fuelwood estimated their own use at 5.6 cords per year. Monticello is significantly cooler than other communities in the county, and studies (Marsinko, Phillips, and Cordell, 1984) have shown that respondents consistently underestimate fuelwood quantities when using cords as the unit of measure.

Based on both the research and the survey of BLM employees, the analysis assumed that an average of 4 cords per year are used by households using fuelwood as a major source of heat. This relatively high figure should help account for wood consumption in those households that use fuelwood but not as a major heating source.

CULTURAL RESOURCES

Calculating the local importance of cultural resources required estimating the average annual local economic activity due to clearances, mitigation, and research. The SJRA archaeologist estimated average annual person-days and consultant charges, based on experience during the previous 3 years.

Sales to local consultants were directly entered into the economic model. Nonlocal consultants also generate local economic activity through local purchases of food, lodging, and business supplies. Local expenditure estimates were based on government rates for food, lodging, and miscellaneous per diem. These local expenditure estimates were also entered into the county economic model (see table GI-2).

TABLE GI-1

Estimated Local Expenditures for Fuelwood and Christmas Trees

	Private	Commercial	
		Small	Large
Fuelwood (per cord)	$ 16.50		
Christmas trees (per tree)	$ 4.00	$ 1.00	$ 0.25

TABLE GI-2

Cultural Resource Economic Statistics

	Person-Days/Year (Local)	Local Expenditures Per Day
Clearances		
Local consultants	250	$ 250
Nonlocal consultants	375	30
Excavation		
Local consultants	18	300
Nonlocal consultants	18	30
Research		
Local consultants		
Nonlocal consultants	720	30

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LIST OF PREPARERS

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Carol B. Behunin, Editorial Assistant, was the principal typist for this planning effort. Carol has worked in the SJRA since 1968 and has a total of 21 years experience in this and related jobs.

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Joseph G. Cresto, Wildlife Management Biologist, prepared the wildlife profile in Part I and the analysis of program 4350 Wildlife Habitat Management. Joe has worked in the MDO since 1975 and has a total of 19 years experience in this and related jobs.

Les E. Dobson, Staff Hydrologist, prepared the water profile in Part I and the analysis of program 4310 Forest Management, as well as the air quality portion of program 4340 Soil, Water and Air. Les has worked in the MDO since 1983 and has a total of 4 years experience in this and related jobs.

David Hansen, Soil Scientist, prepared the soils and aerial photography profiles in Part I and the analysis of soils and water for program 4340 Soil, Water, and Air. Dave has worked in the MDO since 1979 and has a total of 12 years experience in this and related jobs.

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Annette Jameson, Realty Specialist, prepared the access and cadastral survey profiles in Part I, prepared the analysis of programs 4211 Energy Realty, 4212 Non-Energy Realty, and 4213 Withdrawal Processing and Review, and calculated surface and subsurface management acreages from the master title plats. Annette has worked in the SJRA since 1982 and has a total of 12 years experience in this and related jobs.

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Sherwin N. Sandberg, Supervisory Range Conservationist, prepared the profiles of vegetation and land treatments and management facilities in Part I, as well as the analysis of programs 4322 Grazing Management and 4360 Fire Management. Nick has worked in the SJRA since 1972 and has a total of 14 years experience in this and related jobs.

Edward R. Scherick, San Juan Resource Area Manager, served as a member of the Quality Review Team. Ed has worked in the SJRA since 1979 and has a total of 19 years experience in this and related jobs.

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Robert C. Talley, Landscape Architect, prepared the visual resources portion of program 4333 Recreation Management/Visual Resources Management. Bob has worked in the MDO since 1980 and has a total of 6 years experience in this and related jobs.

Ruth A. Thurston, Writer/Editor was responsible for format, tracking, and editing. She also compiled the table of contents, lists of acronyms and abbreviations, glossary, list of cited references, and the list of preparers. Ruth has worked in the MDO since 1978 and has a total of 22 years experience in this and related jobs.

James J. Travis, Assistant District Manager for Minerals, served as a member of the Quality Review Team. Jim has worked in the MDO since 1983 and has a total of 37 years experience in the minerals industry field.

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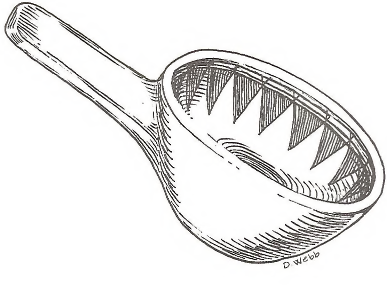
Robert E. Turri, Chief, Realty and Minerals Staff, contributed to the analysis of program 4111 Oil and Gas Leasing. Bob has worked in the SJRA since 1969 and has a total of 9 years experience in this and related jobs.

Alex D. VanHemert, Supervisory Outdoor Recreation Planner, prepared the analysis of program 4332 Wilderness Management and the recreation management portion of program 4333 Recreation Management/Visual Resources Management. Alex has worked in the SJRA since 1981 and has a total of 9 years experience in this and related jobs.

M. Diana Webb, Planning Coordinator, served as the Team Leader for this planning effort and was responsible for overall review and coordination. She also prepared the overview and the list of applicable laws. Diana has worked in the MDO since 1978 and has a total of 18 years experience in this and related jobs.

Kathryn N. Wilson, Clerk/Stenographer, provided clerical support to this planning effort. Kay has worked in the SJRA since 1984 and has a total of 15 years experience in this and related jobs.

OVERLAYS

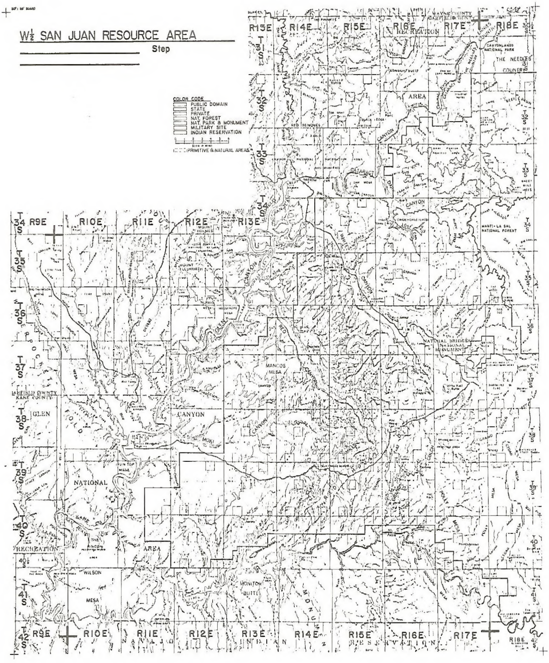


OVERLAYS

The original mylar MSA overlays, at a scale of 1/2 inch to the mile, are available for public inspection at the SJRA office. Reductions of the overlays are included here for the reader's convenience.

These reductions provide a general idea of the scope of resource values present in the SJRA. The base map is presented first to give a general topographic and cultural reference. It is possible for interested readers to have photocopy transparencies made of individual overlays and place them over the base map pages to determine, for example, the extent of crucial deer winter range or the overlap between grazing allotments and various minerals resources.

The overlays were compiled using the best information available at the time of preparation and, like the rest of this MSA, are subject to revision.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GARFIELD COUNTY
KANE COUNTY
CANYONLANDS NATIONAL PARK
THE NEEDLES COUNTRY
CATARACT
CANYON
RED BENCHES
MOUNT HOLMES
MOUNT ELLSWORTH
MANTI-LA SAL NATIONAL FOREST
NATURAL BRIDGES NATIONAL MONUMENT
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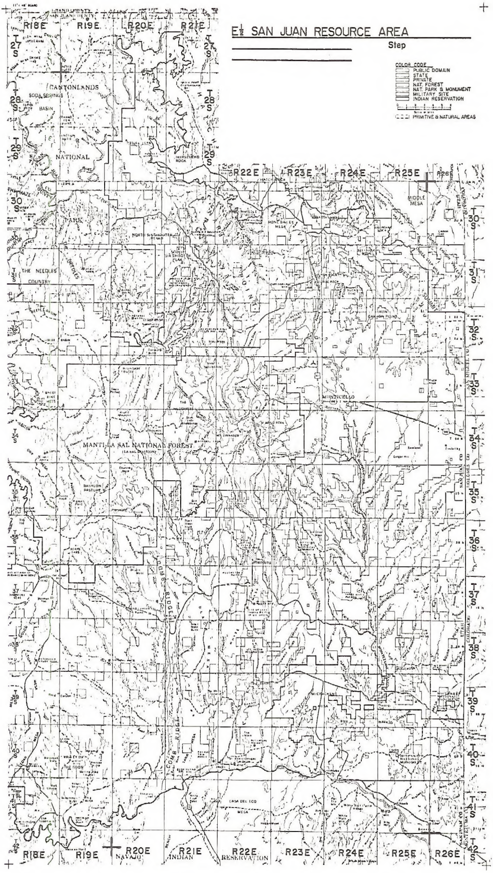
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SODA SPRINGS
BASIN
THE MAZE
THE NEEDLES COUNTRY
NEEDLES
NORTH SIX-SHOOTER PEAK
SOUTH SIX-SHOOTER PEAK
MIDDLE MESA
HATCH
MONTICELLO
MANTI-LA SAL NATIONAL FOREST
(LA SAL DIVISION)
BABYLON PASTURE
COMB RIDGE
BLANDING
BLUFF
VALLEY OF THE GODS
CASA DEL ECO MESA
NAVAJO
INDIAN
RESERVATION
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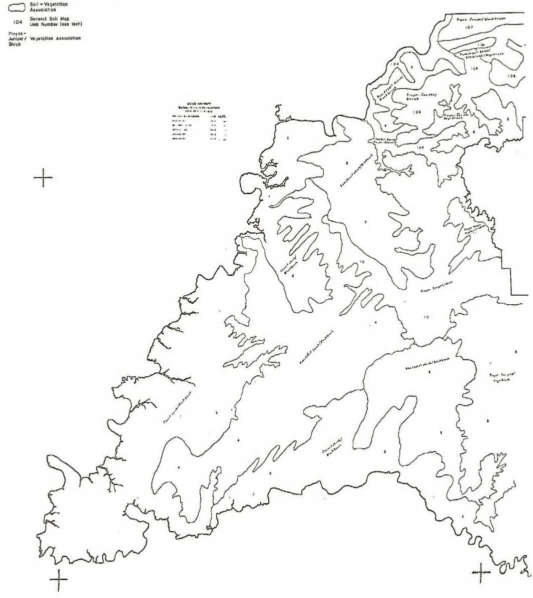
DOLORES CO.
MONTEZUMA CO.
COLORADO
UTAH

W½ SAN JUAN RESOURCE AREA

General Soil and Vegetation Groups


Soil – Vegetation Association
104 General Soil Map Unit Number (see text)
Pinyon-Juniper/Shrub Vegetation Association
Pinyon-Juniper/Blackbrush
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Grassland/Sagebrush
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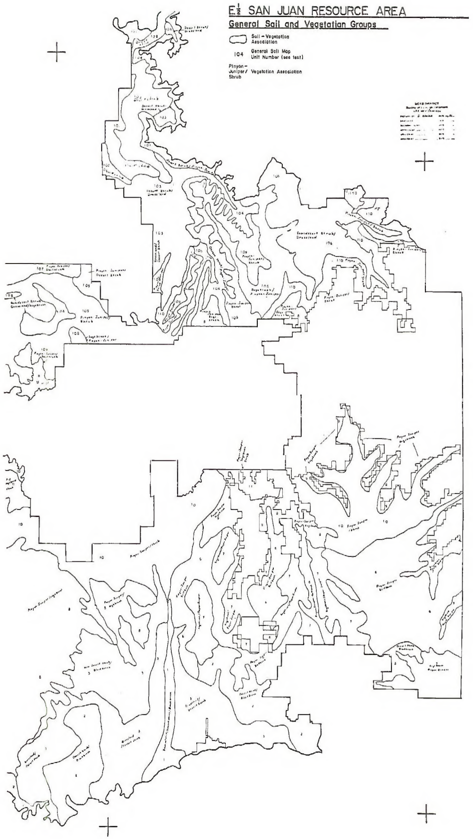
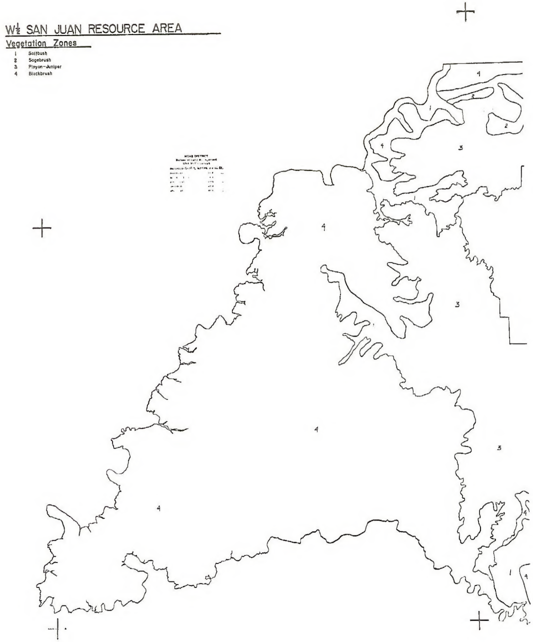
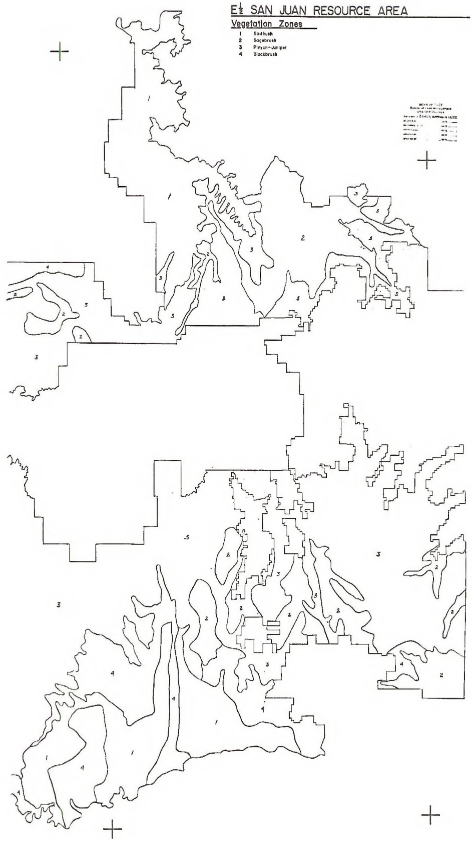


E½ SAN JUAN RESOURCE AREA

General Soil and Vegetation Groups

Soil – Vegetation Association
104 General Soil Map Unit Number (see text)
Pinyon-Juniper/Shrub Vegetation Association


W½ SAN JUAN RESOURCE AREA
Vegetation Zones
1 Saltbush
2 Sagebrush
3 Pinyon-Juniper
4 Blackbrush
MOAB DISTRICT
4
2
2
1
4
3
4
3
4
3
4
4
1
4


E½ SAN JUAN RESOURCE AREA
Vegetation Zones
1 Saltbush
2 Sagebrush
3 Pinyon-Juniper
4 Blackbrush
1
1
2
3
3
3
3
3
3
3
3
4
2
3
2
2
3
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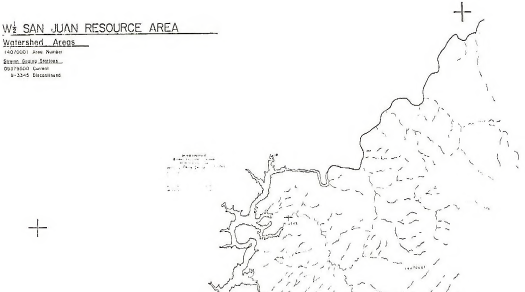
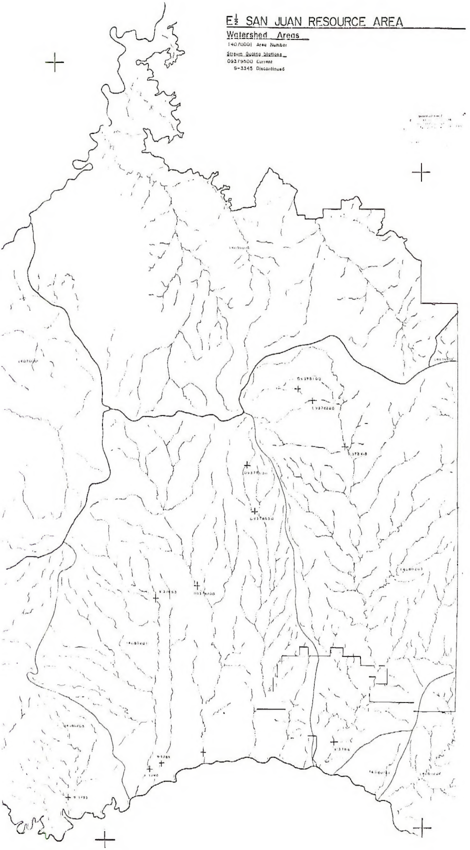
1
1
1
4
4
2
4



W½ SAN JUAN RESOURCE AREA

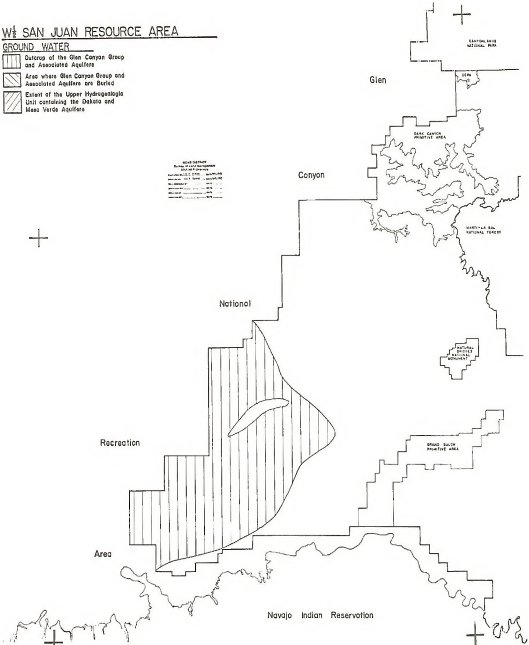
Watershed Areas
14070001 Area Number
Stream Gaging Stations
09379500 Current
9-3345 Discontinued

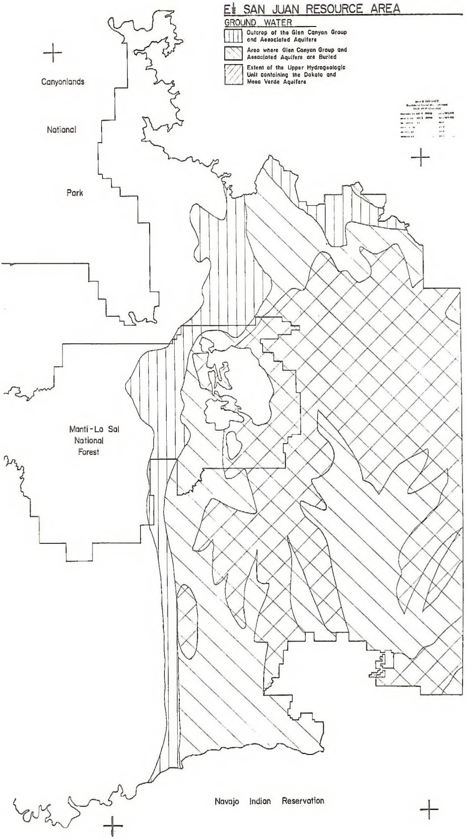


E½ SAN JUAN RESOURCE AREA

Watershed Areas

1407000I Area Number
Stream Gaging Stations
09379500 Current
9-3345 Discontinued
09376200
9-3789
9-3790
9-3793

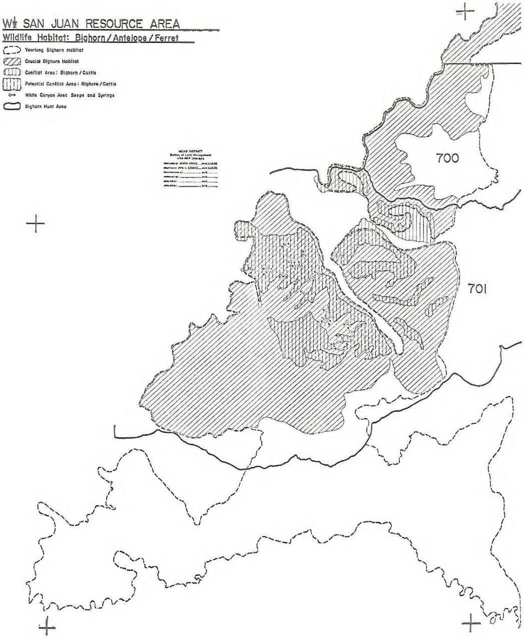

W½ SAN JUAN RESOURCE AREA
GROUND WATER
Outcrop of the Glen Canyon Group and Associated Aquifers
Area where Glen Canyon Group and Associated Aquifers are Buried
Extent of the Upper Hydrogeologic Unit containing the Dakota and Mesa Verde Aquifers
MOAB DISTRICT
Bureau of Land Management
CANYONLANDS NATIONAL PARK
DCPA
Glen
DARK CANYON PRIMITIVE AREA
Canyon
MANTI-LA SAL NATIONAL FOREST
National
NATURAL BRIDGES NATIONAL MONUMENT
Recreation
GRAND GULCH PRIMITIVE AREA
Area
Navajo Indian Reservation



E½ SAN JUAN RESOURCE AREA

GROUND WATER

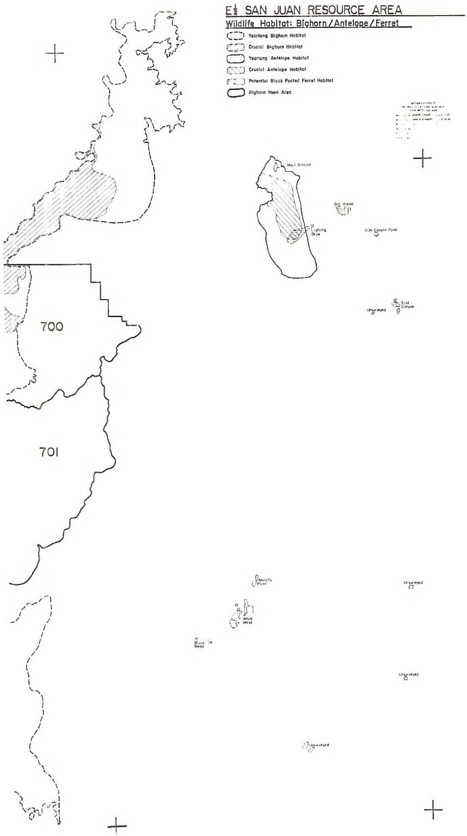
Outcrop of the Glen Canyon Group and Associated Aquifers
Area where Glen Canyon Group and Associated Aquifers are Buried
Extent of the Upper Hydrogeologic Unit containing the Dakota and Mesa Verde Aquifers
Canyonlands National Park
Manti-La Sal National Forest
Navajo Indian Reservation

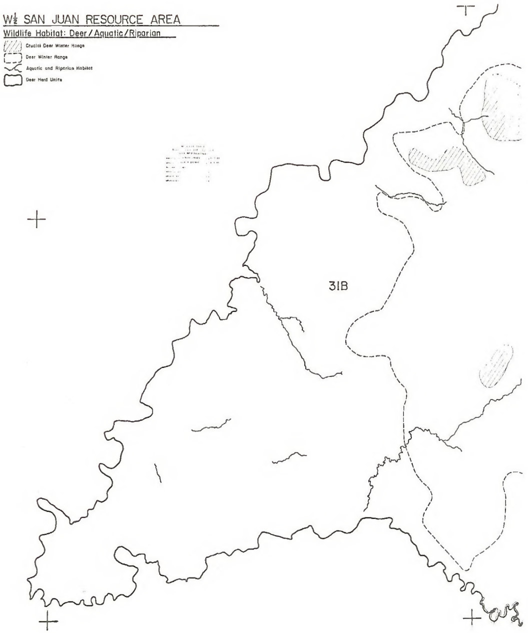


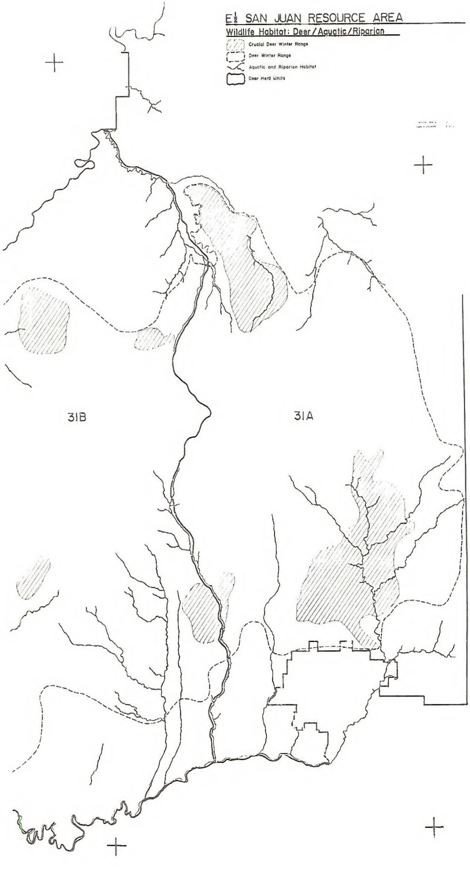
W½ SAN JUAN RESOURCE AREA

Wildlife Habitat: Bighorn / Antelope / Ferret

Yearlong Bighorn Habitat
Crucial Bighorn Habitat
Conflict Area: Bighorn / Cattle
Potential Conflict Area: Bighorn / Cattle
White Canyon Area Seeps and Springs
Bighorn Hunt Area
MOAB DISTRICT
Bureau of Land Management
URA-MFP Overlays
700
701


E½ SAN JUAN RESOURCE AREA
Wildlife Habitat: Bighorn/Antelope/Ferret
Yearlong Bighorn Habitat
Crucial Bighorn Habitat
Yearlong Antelope Habitat
Crucial Antelope Habitat
Potential Black Footed Ferret Habitat
Bighorn Hunt Area
Mail Station
Big Indian
Lighting Draw
Iron Canyon Point
East Canyon
Unsurveyed
700
701
Murphy Point
Unsurveyed
White Mesa
Black
Mesa
Unsurveyed
Unsurveyed


W½ SAN JUAN RESOURCE AREA
Wildlife Habitat: Deer / Aquatic / Riparian
Crucial Deer Winter Range
Deer Winter Range
Aquatic and Riparian Habitat
Deer Herd Units
31B


E½ SAN JUAN RESOURCE AREA
Wildlife Habitat: Deer/Aquatic/Riparian
Crucial Deer Winter Range
Deer Winter Range
Aquatic and Riparian Habitat
Deer Herd Units
31B
31A

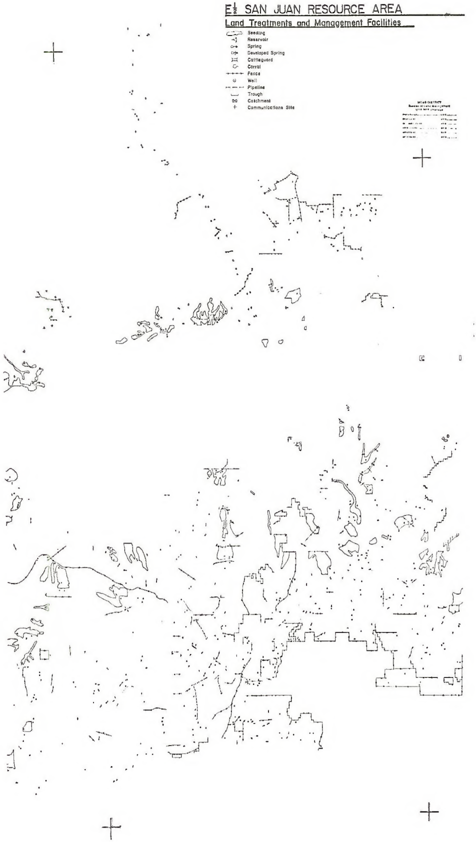
W½ SAN JUAN RESOURCE AREA

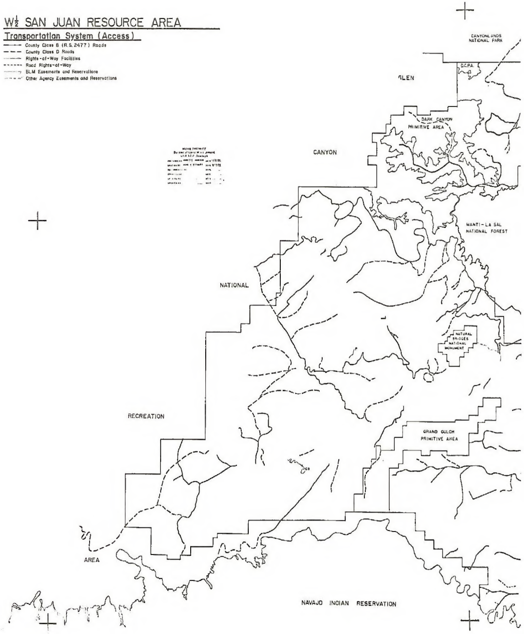
Land Treatments and Management Facilities

Seeding
Reservoir
Spring
Developed Spring
Cattleguard
Corral
Fence
Well
Pipeline
Trough
Catchment
Communications Site
MOAB DISTRICT
Bureau of Land Management

E½ SAN JUAN RESOURCE AREA

Land Treatments and Management Facilities

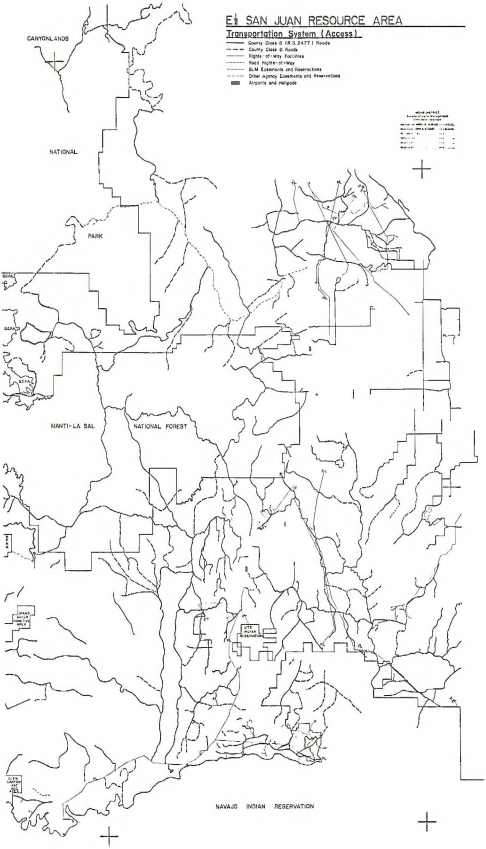

Seeding
Reservoir
Spring
Developed Spring
Cattleguard
Corral
Fence
Well
Pipeline
Trough
Catchment
Communications Site
MOAB DISTRICT
Bureau of Land Management



W½ SAN JUAN RESOURCE AREA

Transportation System (Access)

County Class B (R.S. 2477) Roads
County Class D Roads
Rights-of-Way Facilities
Road Rights-of-Way
BLM Easements and Reservations
Other Agency Easements and Reservations
MOAB DISTRICT
Bureau of Land Management
CANYONLANDS NATIONAL PARK
G.C.P.A.
GLEN
DARK CANYON PRIMITIVE AREA
CANYON
MANTI-LA SAL NATIONAL FOREST
NATIONAL
NATURAL BRIDGES NATIONAL MONUMENT
RECREATION
GRAND GULCH PRIMITIVE AREA
AREA
NAVAJO INDIAN RESERVATION

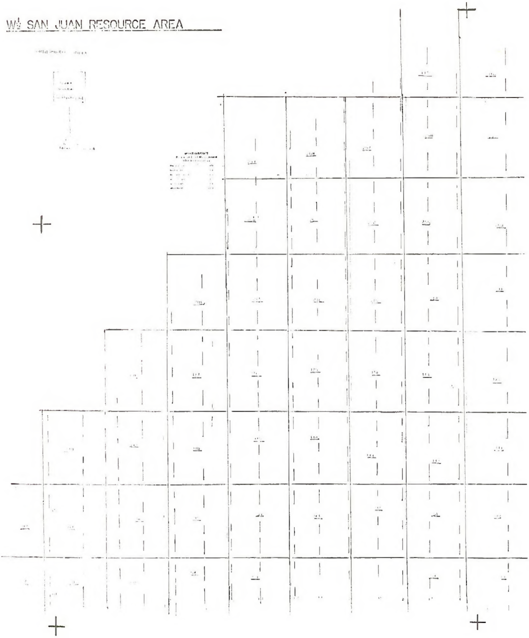


E½ SAN JUAN RESOURCE AREA

Transportation System (Access)

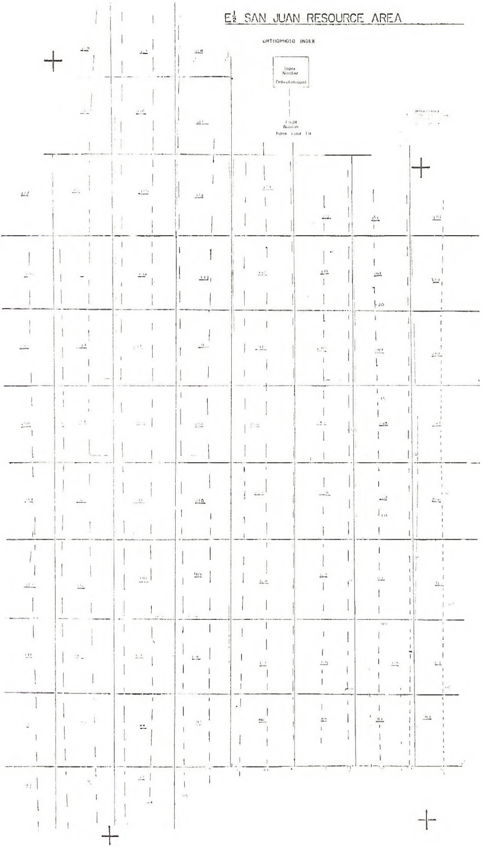
County Class B (R.S. 2477) Roads
County Class D Roads
Rights-of-Way Facilities
Road Rights-of-Way
BLM Easements and Reservations
Other Agency Easements and Reservations
Airports and Helipads
MOAB DISTRICT
Bureau of Land Management
CANYONLANDS
NATIONAL
PARK
G.C.P.A.
MANTI-LA SAL
NATIONAL FOREST
GRAND GULCH PRIMITIVE AREA
UTE INDIAN RESERVATION
GLEN CANYON NAT. REC. AREA
NAVAJO INDIAN RESERVATION
PL

W½ SAN JUAN RESOURCE AREA



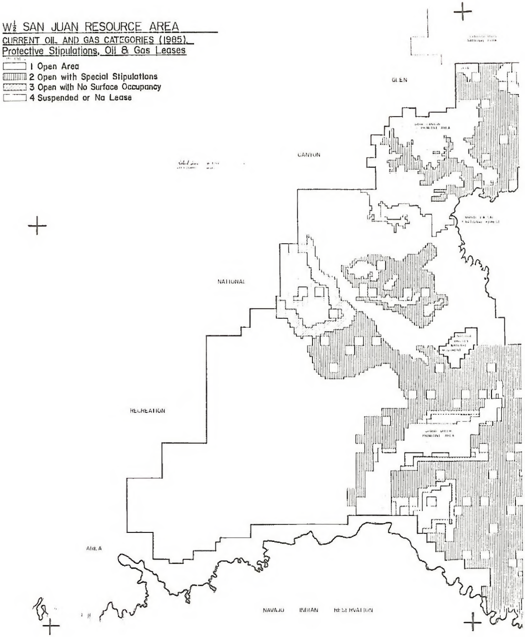
E½ SAN JUAN RESOURCE AREA

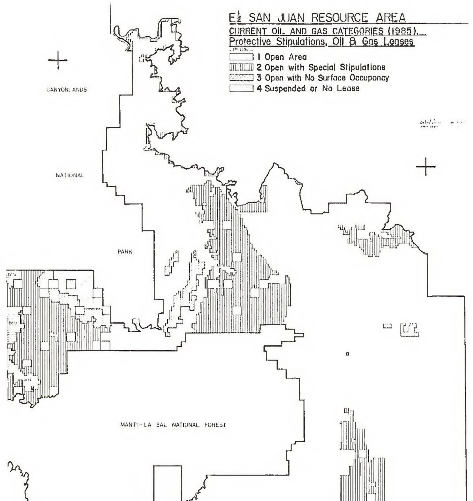
ORTHOPHOTO INDEX

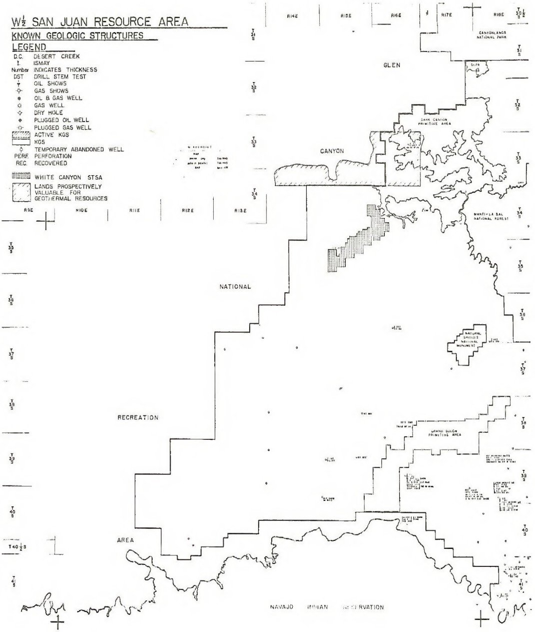

Index Number
Orthophotoquad
Flight Number
False Color IR

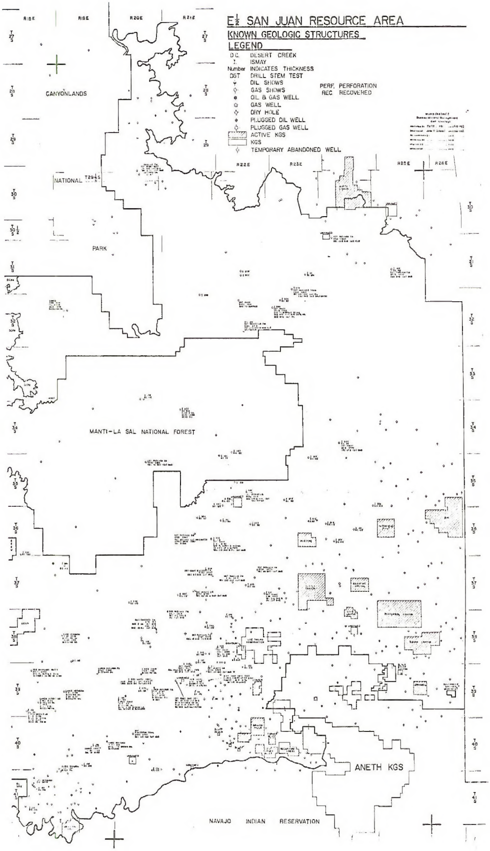
W½ SAN JUAN RESOURCE AREA

CURRENT OIL AND GAS CATEGORIES (1985). Protective Stipulations, Oil & Gas Leases

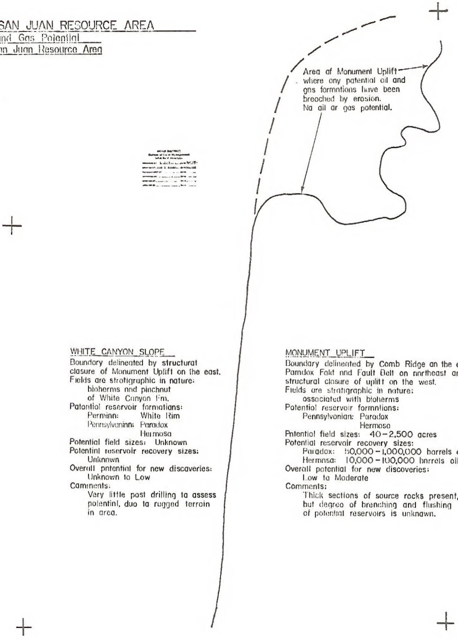

1 Open Area
▥ 2 Open with Special Stipulations
▨ 3 Open with No Surface Occupancy
4 Suspended or No Lease
GLEN
CANYON
NATIONAL
RECREATION
AREA
PRIMITIVE AREA
NAVAJO INDIAN RESERVATION


E½ SAN JUAN RESOURCE AREA
CURRENT OIL AND GAS CATEGORIES (1985),
Protective Stipulations, Oil & Gas Leases
▭ 1 Open Area
▥ 2 Open with Special Stipulations
▨ 3 Open with No Surface Occupancy
▭ 4 Suspended or No Lease
CANYONLANDS
NATIONAL
PARK
MANTI-LA SAL NATIONAL FOREST
NAVAJO INDIAN RESERVATION


W½ SAN JUAN RESOURCE AREA
KNOWN GEOLOGIC STRUCTURES
LEGEND
D.C. DESERT CREEK
I ISMAY
Number INDICATES THICKNESS
DST DRILL STEM TEST
OIL SHOWS
GAS SHOWS
OIL & GAS WELL
GAS WELL
DRY HOLE
PLUGGED OIL WELL
PLUGGED GAS WELL
ACTIVE KGS
KGS
TEMPORARY ABANDONED WELL
PERF. PERFORATION
REC. RECOVERED
WHITE CANYON STSA
LANDS PROSPECTIVELY VALUABLE FOR GEOTHERMAL RESOURCES
R14E
R15E
R16E
R17E
R18E
R9E
R10E
R11E
R12E
R13E
T 30½ S
T 31 S
T 32 S
T 33 S
T 34 S
T 35 S
T 36 S
T 37 S
T 38 S
T 39 S
T 40 S
T 40½ S
T 41 S
CANYONLANDS NATIONAL PARK
GLEN
CANYON
NATIONAL
RECREATION
AREA
DARK CANYON PRIMITIVE AREA
MANTI-LA SAL NATIONAL FOREST
NATURAL BRIDGES NATIONAL MONUMENT
GRAND GULCH PRIMITIVE AREA
NAVAJO INDIAN RESERVATION


E½ SAN JUAN RESOURCE AREA
KNOWN GEOLOGIC STRUCTURES
LEGEND
D.C. DESERT CREEK
I. ISMAY
Number INDICATES THICKNESS
DST DRILL STEM TEST
OIL SHOWS
GAS SHOWS
OIL & GAS WELL
GAS WELL
DRY HOLE
PLUGGED OIL WELL
PLUGGED GAS WELL
ACTIVE KGS
KGS
TEMPORARY ABANDONED WELL
PERF. PERFORATION
REC. RECOVERED
R18E
R19E
R20E
R21E
R22E
R23E
R25E
R26E
T 27 S
T 28 S
T 29 S
T 29½ S
T 30 S
T 30½ S
T 31 S
T 32 S
T 33 S
T 34 S
T 35 S
T 36 S
T 37 S
T 38 S
T 39 S
T 40 S
T 41 S
CANYONLANDS
NATIONAL
PARK
MANTI-LA SAL NATIONAL FOREST
ANETH KGS
NAVAJO INDIAN RESERVATION

W½ SAN JUAN RESOURCE AREA
Oil and Gas Potential
of San Juan Resource Area



Area of Monument Uplift where any potential oil and gas formations have been breached by erosion.
No oil or gas potential.

WHITE CANYON SLOPE

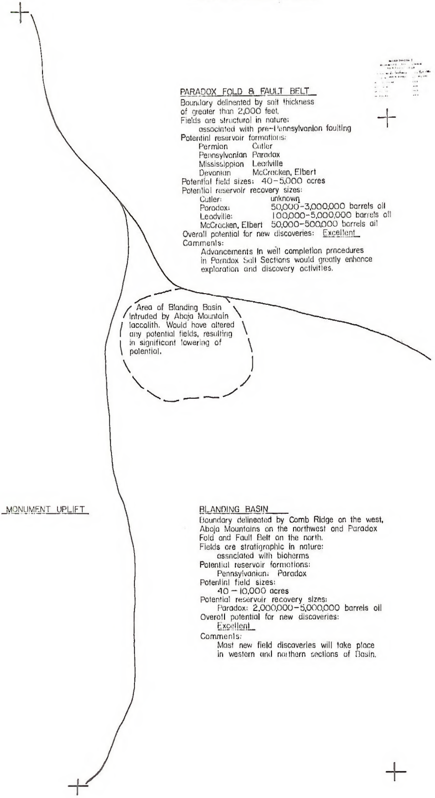
Boundary delineated by structural closure of Monument Uplift on the east.
Fields are stratigraphic in nature:
  bioherms and pinchout
  of White Canyon Fm.
Potential reservoir formations:
  Permian: White Rim
  Pennsylvanian: Paradox
  Hermosa
Potential field sizes: Unknown
Potential reservoir recovery sizes:
  Unknown
Overall potential for new discoveries:
  Unknown to Low
Comments:
  Very little post drilling to assess potential, due to rugged terrain in area.

MONUMENT UPLIFT

Boundary delineated by Comb Ridge on the east, Paradox Fold and Fault Belt on northeast and structural closure of uplift on the west.
Fields are stratigraphic in nature:
  associated with bioherms
Potential reservoir formations:
  Pennsylvanian: Paradox
  Hermosa
Potential field sizes: 40–2,500 acres
Potential reservoir recovery sizes:
  Paradox: 50,000–1,000,000 barrels oil
  Hermosa: 10,000–100,000 barrels oil
Overall potential for new discoveries:
  Low to Moderate
Comments:
  Thick sections of source rocks present, but degree of breaching and flushing of potential reservoirs is unknown.

E½ SAN JUAN RESOURCE AREA

Oil and Gas Potential of San Juan Resource Area



PARADOX FOLD & FAULT BELT

Boundary delineated by salt thickness of greater than 2,000 feet.

Fields are structural in nature:
associated with pre-Pennsylvanian faulting

Potential reservoir formations:

Permian	Cutler
Pennsylvanian	Paradox
Mississippian	Leadville
Devonian	McCracken, Elbert

Potential field sizes: 40-5,000 acres

Potential reservoir recovery sizes:

Cutler:	unknown
Paradox:	50,000-3,000,000 barrels oil
Leadville:	100,000-5,000,000 barrels oil
McCracken, Elbert	50,000-500,000 barrels oil

Overall potential for new discoveries: Excellent

Comments:
Advancements in well completion procedures in Paradox Salt Sections would greatly enhance exploration and discovery activities.

Area of Blanding Basin intruded by Abaja Mountain laccolith. Would have altered any potential fields, resulting in significant lowering of potential.

MONUMENT UPLIFT

BLANDING BASIN

Boundary delineated by Comb Ridge on the west, Aboja Mountains on the northwest and Paradox Fold and Fault Belt on the north.

Fields are stratigraphic in nature:
associated with bioherms

Potential reservoir formations:
Pennsylvanian: Paradox

Potential field sizes:
40 – 10,000 acres

Potential reservoir recovery sizes:
Paradox: 2,000,000-5,000,000 barrels oil

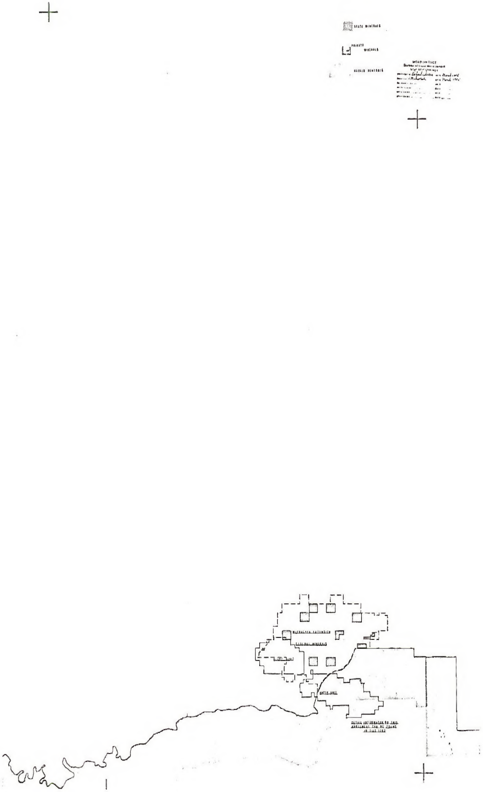
Overall potential for new discoveries:
Excellent

Comments:
Most new field discoveries will take place in western and northern sections of Basin.

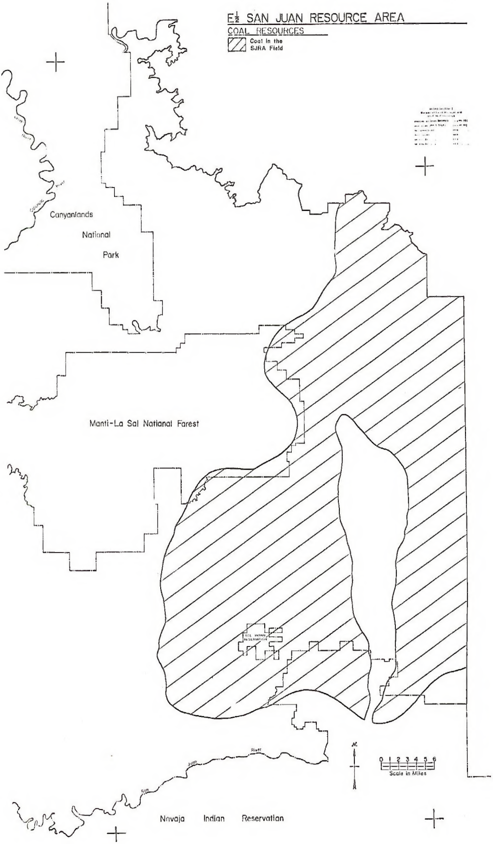
NOTE: No west half overlay was necessary to show the MOU with Farmington Resource Area.

E½ SAN JUAN RESOURCE AREA

MOU with Farmington Resource Area


STATE MINERALS
PRIVATE MINERALS
NAVAJO MINERALS
FEDERAL MINERALS

NOTE: No west half overlay was necessary to show coal resources.

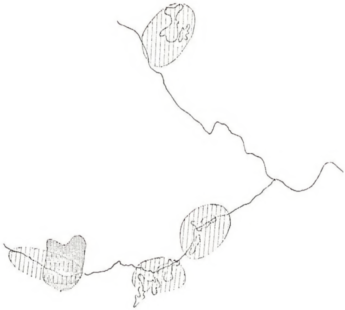

E½ SAN JUAN RESOURCE AREA
COAL RESOURCES
▨ Coal in the SJRA Field
Canyonlands National Park
Colorado River
Manti-La Sal National Forest
UTE INDIAN RESERVATION
San Juan River
Navajo Indian Reservation
N
0 1 2 3 4 5 6
Scale in Miles

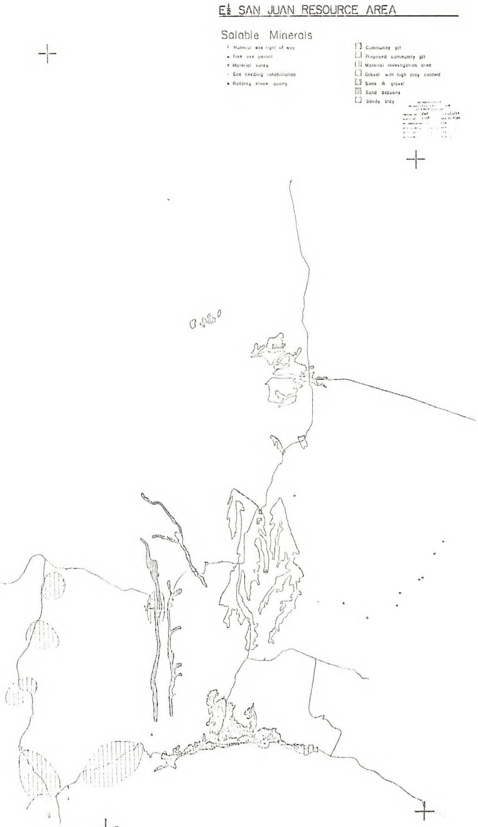
W½ SAN JUAN RESOURCE AREA

Salable Minerals

- ⬚ Material investigation area
- ☐ Alluvial deposits
- ▥ Dune sand deposits

MOAB DISTRICT
Bureau of Land Management



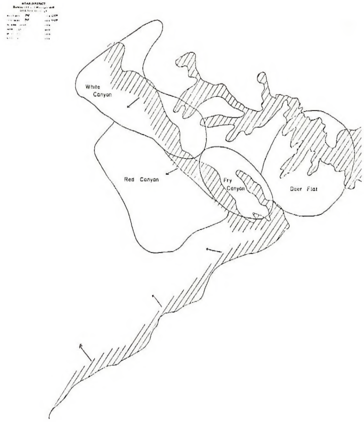

E½ SAN JUAN RESOURCE AREA
Salable Minerals
Material site right of way
Free use permit
Material sales
Site needing rehabilitation
Building stone quarry
Community pit
Proposed community pit
Material investigation area
Gravel with high clay content
Sand & gravel
Sand deposits
Sandy clay

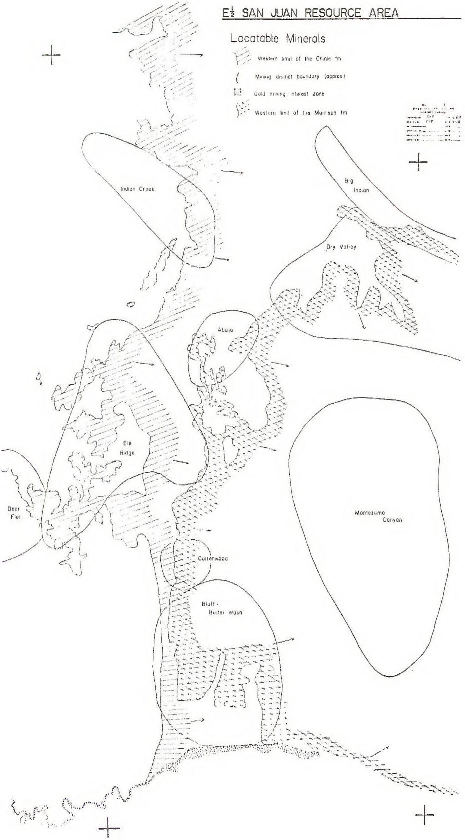
W½ SAN JUAN RESOURCE AREA

Locatable Minerals

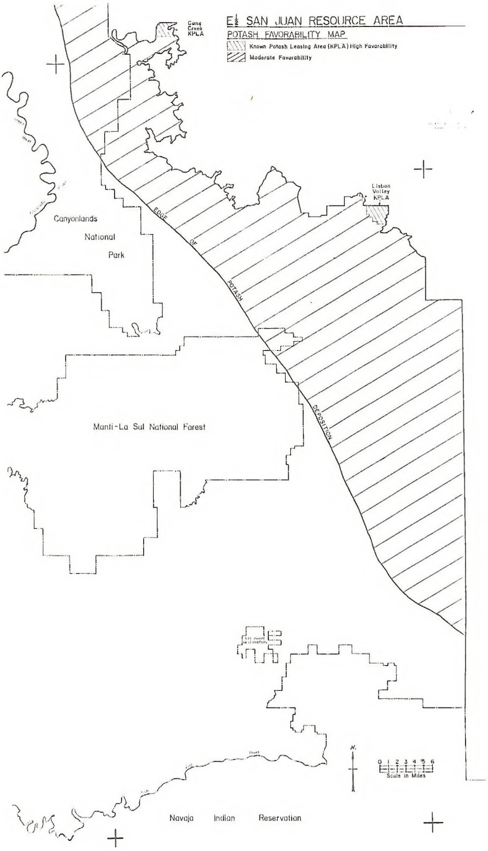
▨ Eastern limit of the Chinle fm

) Mining district boundary (approx)


White Canyon
Red Canyon
Fry Canyon
Deer Flat


E½ SAN JUAN RESOURCE AREA
Locatable Minerals
Western limit of the Chinle fm
Mining district boundary (approx)
Gold mining interest zone
Western limit of the Morrison fm
Indian Creek
Big Indian
Dry Valley
Abajo
Elk Ridge
Deer Flat
Montezuma Canyon
Cottonwood
Bluff - Butler Wash

NOTE: No west half overlay was necessary to show potash favorability.

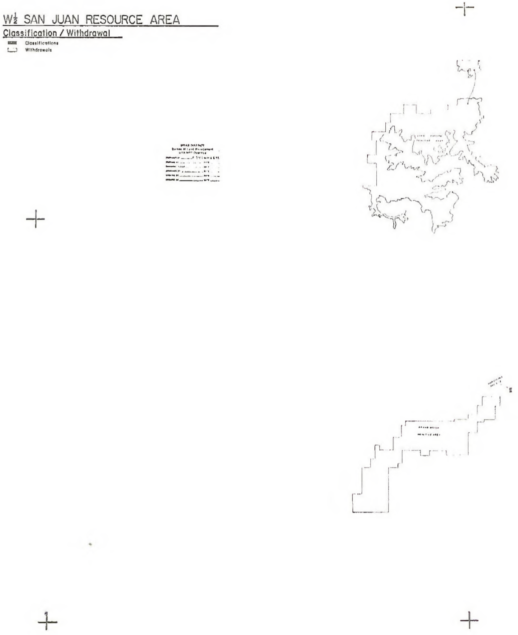

Cane
Creek
KPLA
Lisbon
Valley
KPLA
Canyonlands
National
Park
EDGE OF POTASH DEPOSITION
Manti-La Sal National Forest
Navajo Indian Reservation
N.
0 1 2 3 4 5 6
Scale in Miles

E½ SAN JUAN RESOURCE AREA

POTASH FAVORABILITY MAP

▨ Known Potash Leasing Area (KPLA) High Favorability

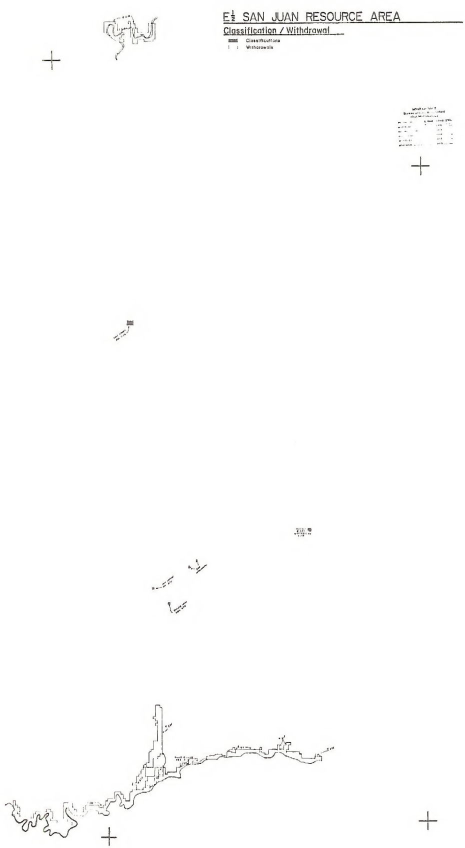
▨ Moderate Favorability



W½ SAN JUAN RESOURCE AREA

Classification / Withdrawal

Classifications
Withdrawals
MOAB DISTRICT
Bureau of Land Management

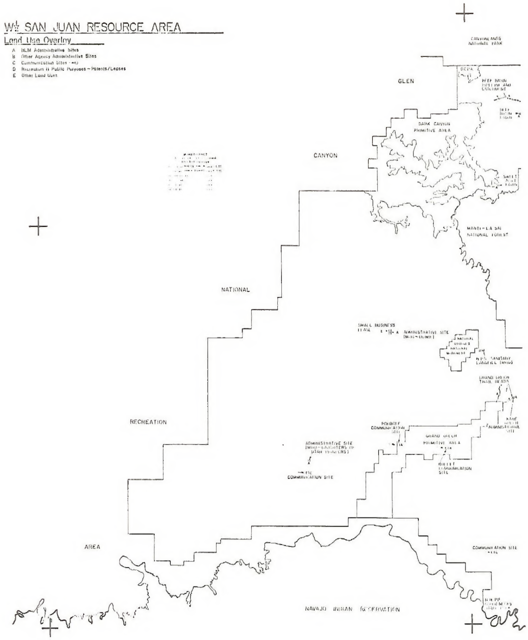


E½ SAN JUAN RESOURCE AREA

Classification / Withdrawal

▨ Classifications

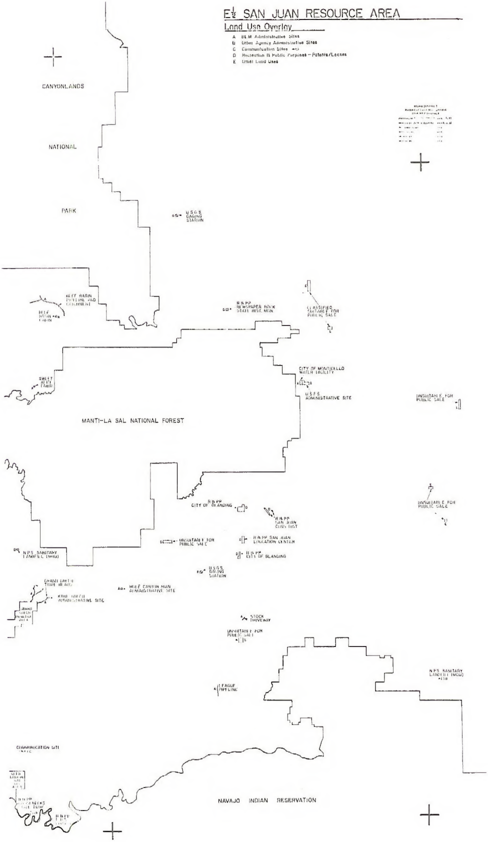
☐ Withdrawals

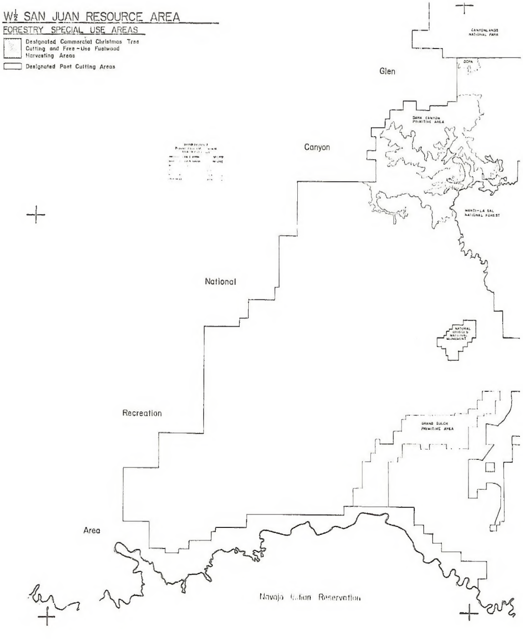

W½ SAN JUAN RESOURCE AREA
Land Use Overlay
A BLM Administrative Sites
B Other Agency Administrative Sites
C Communication Sites
D Recreation & Public Purposes – Patents/Leases
E Other Land Uses
CANYONLANDS NATIONAL PARK
GLEN
CANYON
NATIONAL
RECREATION
AREA
DARK CANYON PRIMITIVE AREA
BEEF BASIN PIPELINE AND CATCHMENT
BEEF BASIN CABIN
SWEET ALICE CABIN
MANTI-LA SAL NATIONAL FOREST
SMALL BUSINESS LEASE
ADMINISTRATIVE SITE
NATURAL BRIDGES NATIONAL MONUMENT
N.P.S. SANITARY LANDFILL
GRAND GULCH TRAIL HEADS
KANE GULCH ADMINISTRATIVE SITE
COMMUNICATION SITE
GRAND GULCH PRIMITIVE AREA
BULLET COMMUNICATION SITE
ADMINISTRATIVE SITE
COMMUNICATION SITE
COMMUNICATION SITE
GOOSENECKS STATE PARK
NAVAJO INDIAN RESERVATION

E½ SAN JUAN RESOURCE AREA

Land Use Overlay

A BLM Administrative Sites
B Other Agency Administrative Sites
C Communication Sites
D Recreation & Public Purposes – Patents/Leases
E Other Land Uses

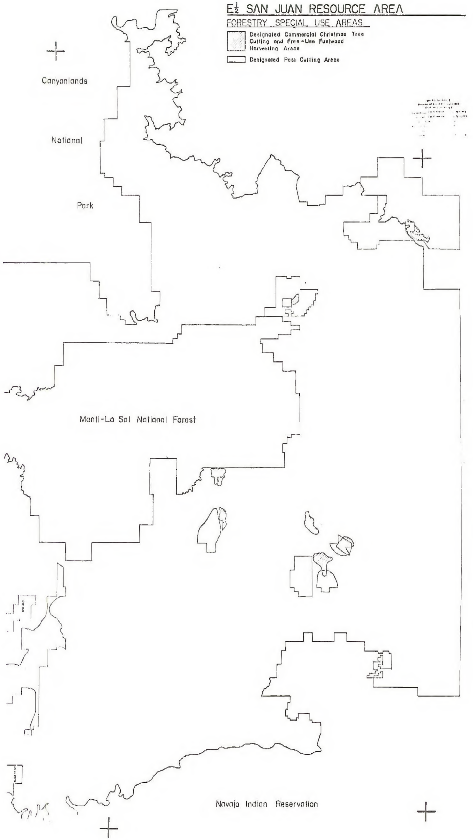

CANYONLANDS
NATIONAL
PARK
USGS GAGING STATION
BEEF BASIN PIPELINE AND CATCHMENT
BEEF BASIN CABIN
R&PP NEWSPAPER ROCK STATE HIST. MON.
CLASSIFIED SUITABLE FOR PUBLIC SALE
CITY OF MONTICELLO WATER FACILITY
USFS ADMINISTRATIVE SITE
SWEET ALICE CABIN
UNSUITABLE FOR PUBLIC SALE
MANTI-LA SAL NATIONAL FOREST
UNSUITABLE FOR PUBLIC SALE
R&PP CITY OF BLANDING
R&PP SAN JUAN CONS. DIST.
UNSUITABLE FOR PUBLIC SALE
R&PP SAN JUAN EDUCATION CENTER
N.P.S. SANITARY LANDFILL (MOU)
R&PP CITY OF BLANDING
USGS GAGING STATION
GRAND GULCH TRAIL HEADS
MULE CANYON RUIN ADMINISTRATIVE SITE
KANE GULCH ADMINISTRATIVE SITE
GRAND GULCH PRIMITIVE AREA
STOCK DRIVEWAY
UNSUITABLE FOR PUBLIC SALE
N.P.S. SANITARY LANDFILL (MOU)
LEAGUE PIPELINE
COMMUNICATION SITE
GLEN CANYON NAT. REC. AREA
R&PP GOOSENECKS STATE PARK
R&PP
NAVAJO INDIAN RESERVATION

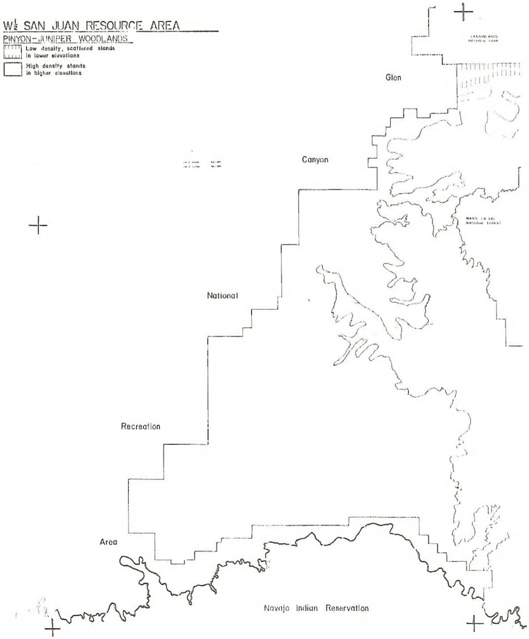


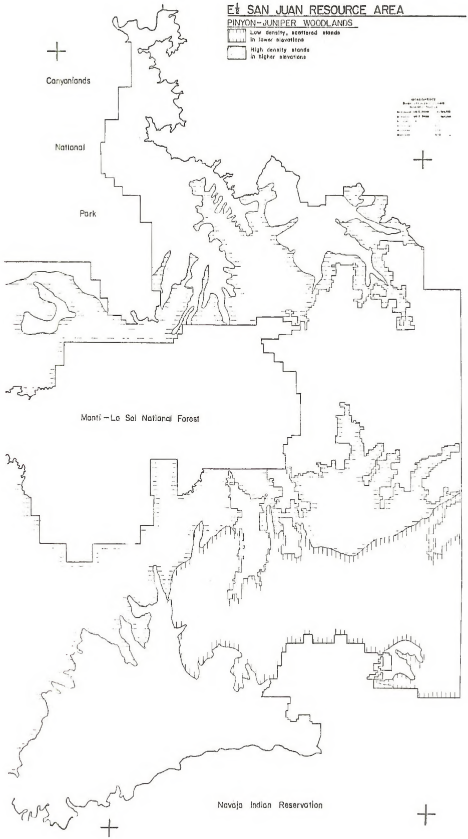
W½ SAN JUAN RESOURCE AREA

FORESTRY SPECIAL USE AREAS

Designated Commercial Christmas Tree Cutting and Free-Use Fuelwood Harvesting Areas
Designated Post Cutting Areas
CANYONLANDS NATIONAL PARK
DCPA
Glen
DARK CANYON PRIMITIVE AREA
Canyon
MANTI-LA SAL NATIONAL FOREST
National
NATURAL BRIDGES NATIONAL MONUMENT
Recreation
GRAND GULCH PRIMITIVE AREA
Area
Navajo Nation Reservation


E½ SAN JUAN RESOURCE AREA
FORESTRY SPECIAL USE AREAS
Designated Commercial Christmas Tree Cutting and Free-Use Fuelwood Harvesting Areas
Designated Post Cutting Areas
Canyonlands
National
Park
Manti-La Sal National Forest
Navajo Indian Reservation

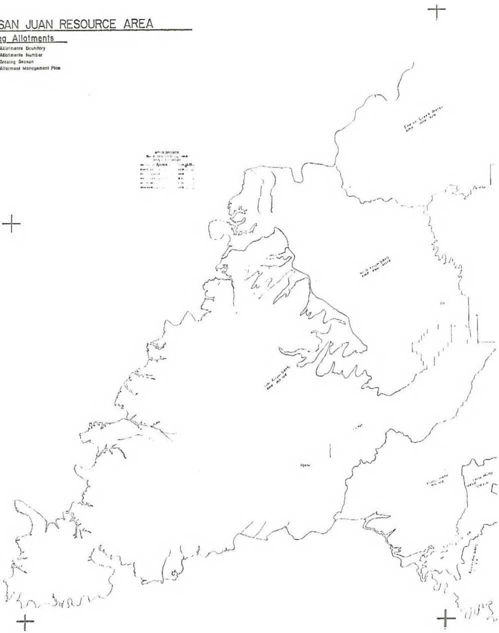

W½ SAN JUAN RESOURCE AREA
PINYON-JUNIPER WOODLANDS
Low density, scattered stands in lower elevations
High density stands in higher elevations
CANYONLANDS NATIONAL PARK
Glen
Canyon
National
Recreation
Area
MANTI LA SAL NATIONAL FOREST
Navajo Indian Reservation

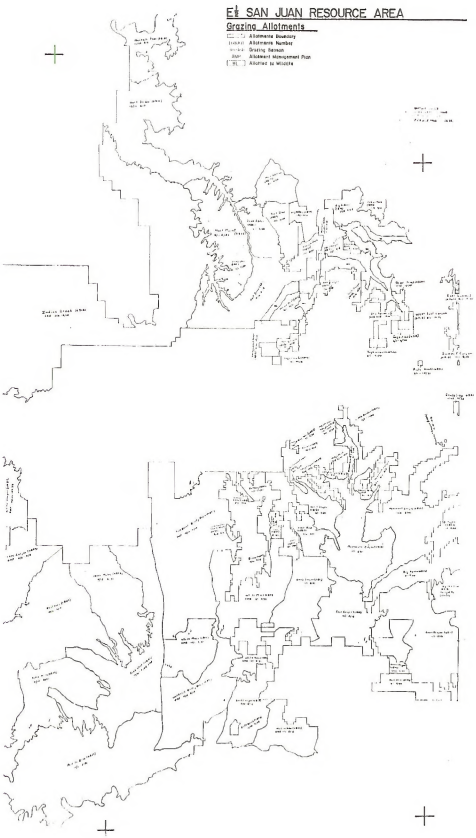

E½ SAN JUAN RESOURCE AREA
PINYON-JUNIPER WOODLANDS
Low density, scattered stands in lower elevations
High density stands in higher elevations
Canyonlands
National
Park
Manti – La Sol National Forest
Navajo Indian Reservation

W½ SAN JUAN RESOURCE AREA

Grazing Allotments

[illegible]	Allotments Boundary
(6800)	Allotments Number
[illegible]	Grazing Season
AMP	Allotment Management Plan





E½ SAN JUAN RESOURCE AREA

Grazing Allotments

Allotments Boundary
Allotments Number
Grazing Season
AMP Allotment Management Plan
WL Allotted to Wildlife
Indian Creek
East Summit
Summit Canyon

W½ SAN JUAN RESOURCE AREA

Potential Land Treatments

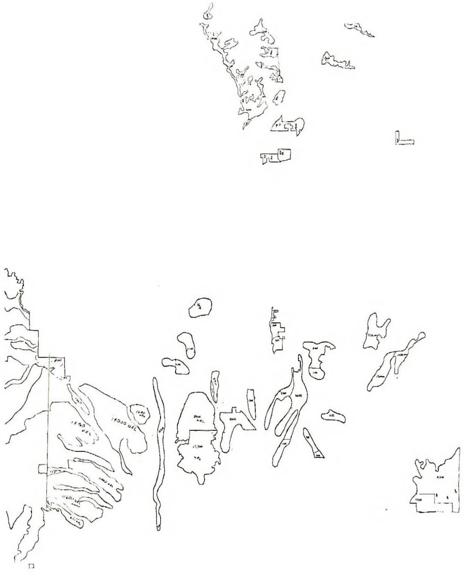
▭ Potential Treatment Area

MOAB DISTRICT
Bureau of Land Management

E½ SAN JUAN RESOURCE AREA

Potential Land Treatments

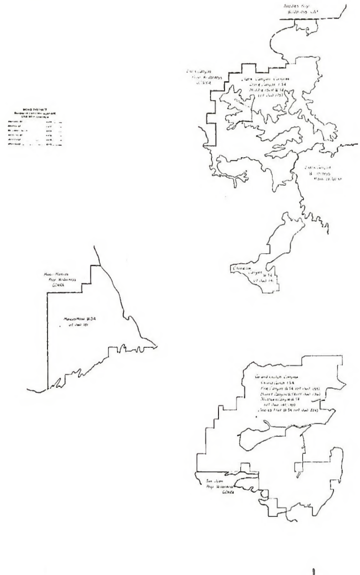
⬭ Potential Treatment Area



W½ SAN JUAN RESOURCE AREA

Wilderness Study Areas

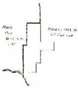
WSA Wilderness Study Area
ISA Instant Study Area

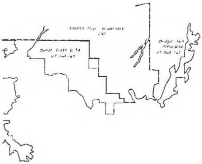

Prop. Wilderness
GCNRA
Mancos Mesa WSA
Prop. Wilderness
GCNRA
San Juan
Prop. Wilderness
GCNRA

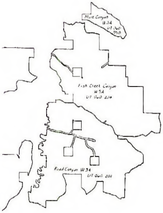
E½ SAN JUAN RESOURCE AREA

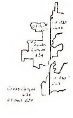
Wilderness Study Areas

WSA Wilderness Study Area
ISA Instant Study Area


Indian Creek WSA


Needles Dist. Wilderness
Butler Wash WSA
Bridger Jack Mesa WSA
UT 060 167

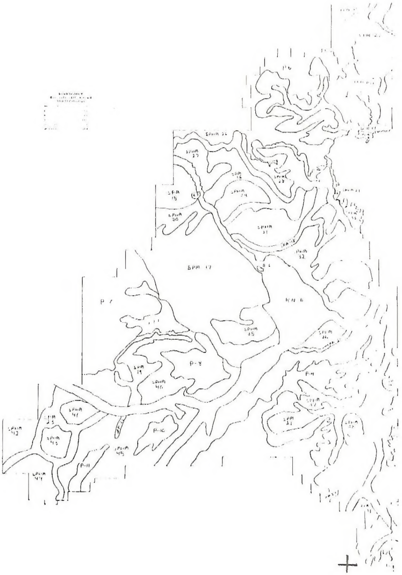

Mule Canyon WSA UT 060 205B
Fish Creek Canyon WSA UT 060 204
Road Canyon WSA UT 060 201


Squaw Canyon WSA
Cross Canyon WSA UT 060 229

W½ SAN JUAN RESOURCE AREA

Recreation Opportunity Spectrum Classes

P	Primitive Class
SPNM	Semi-Primitive Non-Motorized Class
SPM	Semi-Primitive Motorized Class
RN	Roaded Natural Class
R	Rural Class
U	Urban Class


P-6
SPNM 26
SPNM 27
SPM 12
SPNM 28
SPM 15
47
SPNM 29
SPNM 30
SPNM 31
SPNM 32
SPM 17
P-7
RN 6
SPNM 35
SPNM 36
P-8
SPM 19
SPNM 46
P-9
SPNM 37
SPM 21
SPNM 41
SPNM 43
SPNM 42
SPNM 44
P-10
SPNM 45
P-11
SPNM 41

E½ SAN JUAN RESOURCE AREA

Recreation Opportunity Spectrum Classes

P	Primitive Class
SPNM	Semi-Primitive Non-Motorized Class
SPM	Semi-Primitive Motorized Class
RN	Roaded Natural Class
R	Rural Class
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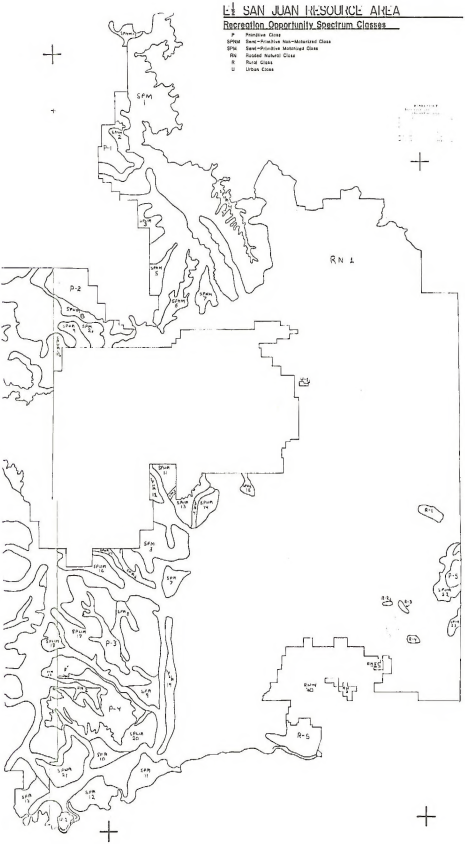
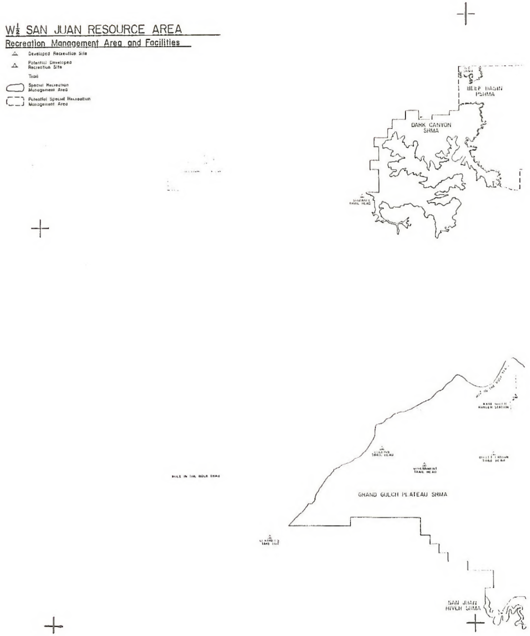
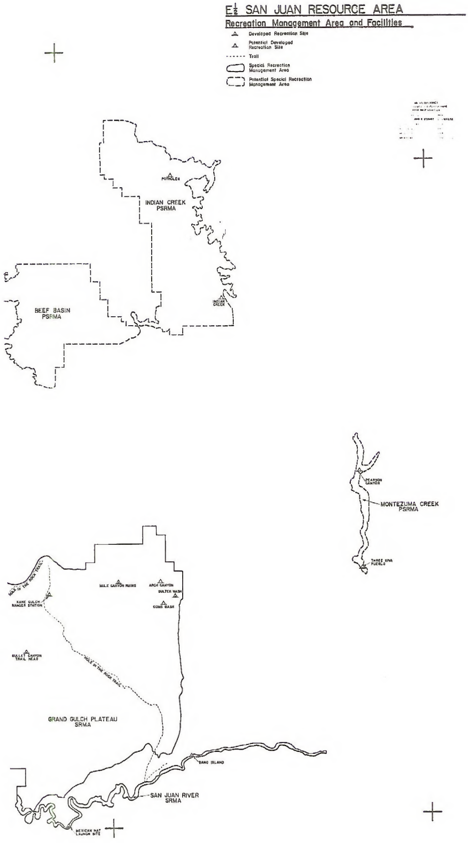

SPNM
SPM 1
SPNM 2
P-1
SPNM 3
SPNM 5
SPNM 6
SPNM 7
RN 1
P-2
SPNM 8
SPNM 9
SPM 2
SPNM 10
U-1
SPNM 11
SPNM 12
SPNM 13
SPNM 14
SPM 15
R-1
SPM 3
SPNM 16
SPM 7
P-5
SPNM 22
R-2
R-3
SPNM 23
R-4
SPNM 17
SPNM 18
P-3
SPNM 19
SPM 9
RN 2
P-4
SPNM 20
SPM 10
SPNM 21
SPM 11
SPM 12
SPM 13
U-2
R-5
RN-4

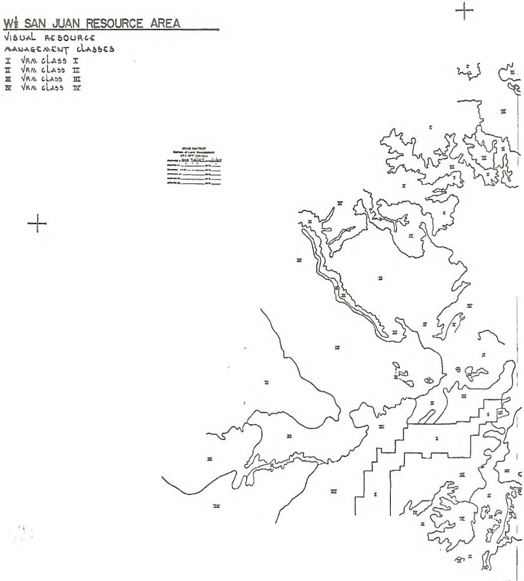


W½ SAN JUAN RESOURCE AREA

Recreation Management Area and Facilities

Developed Recreation Site
Potential Developed Recreation Site
Trail
Special Recreation Management Area
Potential Special Recreation Management Area
BEEF BASIN PSRMA
DARK CANYON SRMA
SUNDANCE TRAIL HEAD
HOLE IN THE ROCK TRAIL
KANE GULCH RANGER STATION
COLLINS TRAIL HEAD
GOVERNMENT TRAIL HEAD
BULLET CANYON TRAIL HEAD
GRAND GULCH PLATEAU SRMA
CLAY HILLS TAKE OUT
SAN JUAN RIVER SRMA


E½ SAN JUAN RESOURCE AREA
Recreation Management Area and Facilities
Developed Recreation Site
Potential Developed Recreation Site
Trail
Special Recreation Management Area
Potential Special Recreation Management Area
POTHOLES
INDIAN CREEK PSRMA
INDIAN CREEK
BEEF BASIN PSRMA
PEARSON CANYON
MONTEZUMA CREEK PSRMA
THREE KIVA PUEBLO
HOLE IN THE ROCK TRAIL
MULE CANYON RUINS
ARCH CANYON
BUTLER WASH
KANE GULCH RANGER STATION
COMB WASH
BULLET CANYON TRAIL HEAD
HOLE IN THE ROCK TRAIL
GRAND GULCH PLATEAU SRMA
SAND ISLAND
SAN JUAN RIVER SRMA
MEXICAN HAT LAUNCH SITE

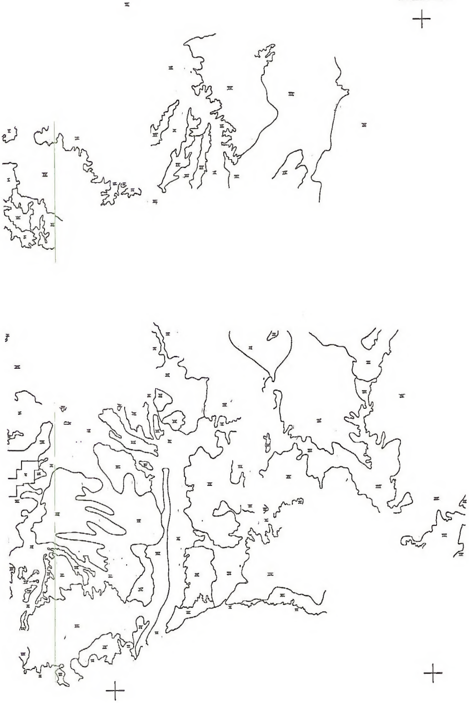

W½ SAN JUAN RESOURCE AREA
VISUAL RESOURCE MANAGEMENT CLASSES
I VRM CLASS I
II VRM CLASS II
III VRM CLASS III
IV VRM CLASS IV
MOAB DISTRICT
Bureau of Land Management
URA MFP Overlays
I
II
III
IV

E½ SAN JUAN RESOURCE AREA

VISUAL RESOURCE
MANAGEMENT CLASSES

I VRM CLASS I
II VRM CLASS II
III VRM CLASS III
IV VRM CLASS IV

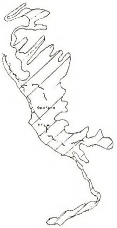
MOAB DISTRICT
Bureau of Land Management
URA MFP Overlays
Prepared by BOB TALLEY [illegible]

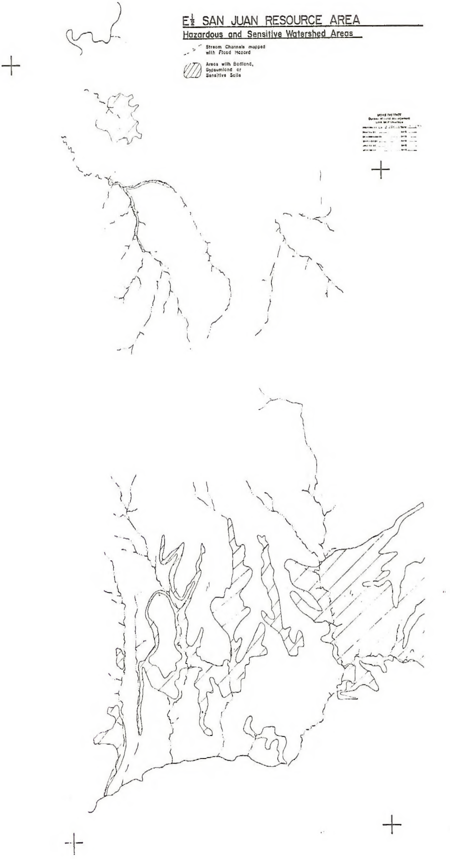


W½ SAN JUAN RESOURCE AREA

Hazardous and Sensitive Watershed Areas

-S-	Stream Channels mapped with Flood Hazard
▨	Areas with Badland, Gypsumland or Sensitive Soils





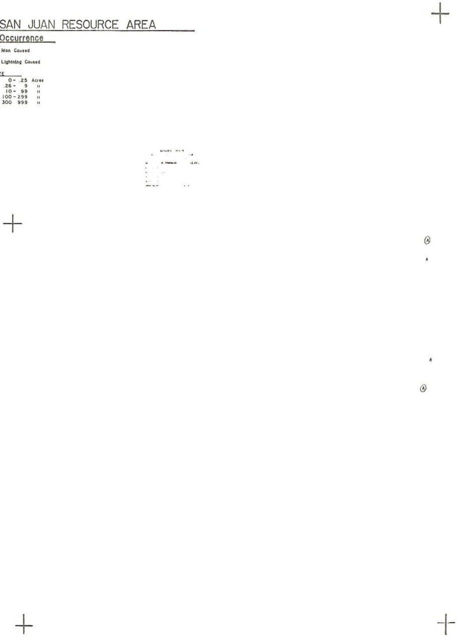
E½ SAN JUAN RESOURCE AREA

Hazardous and Sensitive Watershed Areas

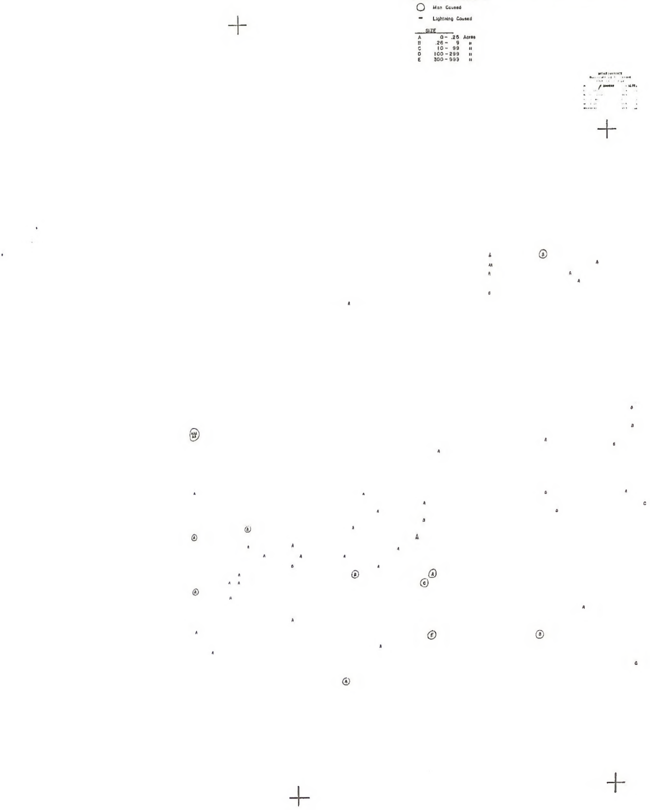
Stream Channels mapped with Flood Hazard
Areas with Badland, Gypsumland or Sensitive Soils
MOAB DISTRICT
Bureau of Land Management

W½ SAN JUAN RESOURCE AREA

Fire Occurrence


○ Man Caused
▬ Lightning Caused
SIZE
A 0 - .25 Acres
B .26 - 9 "
C 10 - 99 "
D 100 - 299 "
E 300 999 "
A
A
A
A

E½ SAN JUAN RESOURCE AREA


Fire Occurrence
Man Caused
Lightning Caused
SIZE
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B .26 - 9 "
C 10 - 99 "
D 100 - 299 "
E 300 - 999 "

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